BREAK-IN

January/February 2012

The Official Journal of the
New Zealand Association of Radio Transmitters (Inc.)

Dedicated to

Amateur Radio and Electronics

in New Zealand since 1928

ZL5KB's adventures into the Antarctic

In this issue:

- A double sideband demodulator; the Mk3 squaring loop.
- Fan dipoles for HF Applications.
- NZART Conference 2012 update.
- Ham on Ice; the fulfilment of an engineer's dream.
- ZL Crossword No.15.

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BREAK-IN

Volume **85**
Number **1**
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*The term **break-in** refers to a system in CW whereby the transmitting station can hear the other station's signal during "key up" periods.*

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EDITOR
John Walker ZL3IB
Phone: (03) 348-9084
Email: <editor@nzart.org.nz>

ASSISTANT EDITORS
Grahame Fraser ZL3SJ
Kelvin Barnsdale ZL3KB
(Technical and Illustrations)

ADVERTISING MANAGER
Lorne Douglas ZL2AHB
Phone: (03) 358-9100
E-mail: <advertmanager@nzart.org.nz>
for — Advertising
— Hamads

EDITORIAL ADDRESS:
EDITOR
BREAK-IN
PO BOX 1733
CHRISTCHURCH 8140
for — Articles for publication
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An apology. My apologies for this rather "skinny" issue but my stock of copy is virtually exhausted. More copy need urgently, Editor

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NZART HEADQUARTERS
Business Manager: Debby Morgan ZL2DL
Suite 9, 19–21 Main Street, Upper Hutt
Office hours: Tuesday – Friday 9am – 2.00pm
Postal Address: PO Box 40-525 Upper Hutt 5140

Telephone: (04) 939-2189
Fax: (04) 939-2190
Email: <nzart.hq@clear.net.nz>
Web: <http://www.nzart.org.nz/nzart> or http://www.nzart.org.nz

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From The Editor

John Walker ZL3IB
<editor@nzart.org.nz>

The *Break-In* team hope that all our readers had an enjoyable Christmas and New Year break. As usual Sheila and I enjoyed time with our families in Auckland and Wanaka. During this time our thoughts often turned to those folk in greater Christchurch who had suffered so much from the earthquakes and maybe lost their homes and hamshacks.

The past year has been a busy one for the *Break-In* team starting with the task of processing the results of the Readership Survey. However that was a worthwhile exercise and provided useful guidance for future needs and trends in *Break-In*. Nevertheless the supply of copy has been, and still is, one of my biggest headaches. It is all very well knowing what our readers want but someone has to actually write it! So, please do not hesitate to send us details of your latest projects, a review of a new rig, trials of a new antenna or a report of your local Branch's recent activities. We need your input!

Writing for Break-In

Nowadays most people will write their copy using a computer and word processor. Electronic copy has many advantages from the editorial point of view but here are a few do's and don'ts that will make my editorial tasks easier.

- Received copy will normally be acknowledged within 1-3 days.
- All copy has to be reformatted by the editor to suit the requirements for typesetting.
- Email copy is best sent as an attached word.doc (*.rtf or *txt files are also acceptable).
- If possible please do not send copy as PDF files; it involves a lot of unnecessary extra work converting them back into word .doc files. NB, Publisher® files are not acceptable because they cannot be read or reprocessed.
- Diagrams, graphs and photographs should be sent as separate attachments; as *.jpg or similar files. Please do NOT embed them in the text (because they are processed separately from the general text.)

Thanks and I hope this helps.

73, *John Walker ZL3IB*
Editor

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From The President

Roy Symon ZL2KH
<zl2kh@xtra.co.nz>

By the time you read this, Don Wallace ZL2TLL, NZART's Administration Liaison Officer, will be at WRC12 in Geneva. Don is part of the New Zealand Government team but is funded by NZART. This is costing your Association over $16 000.

Later this year there will be an IARU Region 3 conference in Ho Chi Minh City. Council will be deciding later this month how much should be spent on this.

Our Association has to make sure that we are getting value for money from the expenditure involved in these overseas visits. On a population basis we are not just a small remote country; we are actually only a medium sized town. We have a population of 4.5 million and there are scores of cities larger than this.

With an aging membership (and therefore more members on lower fixed incomes) can we afford this cost? Do we get value for money? How much money should we spend on protecting our spectrum?

Please ponder on these matters; and let your Council know your opinions. It is your Association and your money.

Roy Symon, ZL2KH
President, NZART Inc

Break-In 50 Years Ago

Craig Crawford ZL3TLB

February 1962

Oscar in Orbit

At 2041 GMT on 12 December 1961 the Oscar satellite was hurled into orbit by the Discoverer 36 launch vehicle from Vandenburgh Air Force Base, California.

The satellite immediately went into a north-south orbit and was picked up loud and clear by the hams at KC4USN at Marie Byrd Base, South Pole a few minutes after launch. The word was quickly relayed back to the Oscar Tracking Station K6QEZ by W4ABY. Acquisition was also obtained by hams at Kodiak Alaska and by KH6UK in Hawaii on the first pass.

Oscar has a tremendous CW signal on a direct overhead pass. W1AW heard the first pass S9 over the east coast. The actual launch was attended by W6SAI, K6LFH, W6MLZ and W0TSN.

As of 19 December 1961, after one week in orbit, the amateur radio satellite Oscar 1 had completed 104 revolutions about the earth on a north-south-north orbit. Reports are beginning to pour into Oscar Headquarters. A total of 296 reports from eleven foreign countries have been received, with radio messages indicating more are on the way. Mail has been delayed because of the Christmas rush, but it is hoped that reports will reach us more rapidly. Reports have proven to be consistent and accurate enough for use in generating tracking predictions. Telemetry information provided by the keying rate of the message "hi" indicates that Oscar 1 is running a fever. Recent data establishes the temperature of the package to be 125 degrees F.

The following is a summary of the Oscar 1 satellite:

- *Frequency:* approximately 144.983 mc/s
- *Power output:* 100 mW
- *HI rate:* proportional to temperature (10 HI's in 20 seconds = 64 degrees F)
- *Tumble rate:* approximately 20 seconds
- *Apogee:* approximately 275 miles
- *Perigee:* approximately 150 miles
- *Orbit period:* approximately 92 minutes
- *Total Doppler shift:* approximately +6.5 kc/s
- *Transmitter:* transistor crystal oscillator on 72.5 mc/s, transistor amplifier and varicap diode doubler to 145 mc/s.
- *Keyer:* transistor multivibrator and counters with diode logic
- *Power supply:* mercury batteries, life expectancy 3 to 4 weeks
- *Antenna:* quarter wave monopole approximately 19 inches long
- *Dimensions:* 12 in x 10 in x 8 in
- *Weight:* 10 pounds
- *Call-sign:* W6EE

NZART Conference 2012 Update

The Conference committee have been working hard to make sure that all amateurs who come to the Conference in June will have a great time, and the way things are shaping up you will have that for sure.

By now some of you would have already registered, and if you have done so thank you for that and we look forward to seeing you in Nelson. Those who haven't, there is plenty of time so don't panic. Registrations close 20 May and after that you will have to pay a late registration fee of $40.00 extra so get in on time if you can to avoid this. You can download the registration form from the club blog site by just Googling Branch 26 NZART and go to the link that advertises the conference, download the registration form, and please remember one registration form per person. Or you can wait for the registration form in the next *Break In.*

Registration fee this year is set at $195.00 for the entire weekend; either full Amateur or full alternative, but you also have a choice. If you would like to do the Amateur programme on Saturday and alternative on Sunday or alternatively the other way, this will be available to you but will cost an extra $5.00 to do this.

Venue is the Tahuna Conference Centre. This is situated at Tahuna Motor Camp which is 6km from Nelson city; this venue is well suited for all types of events which is why we decided to go with it. But there is a limit to numbers we can take, once we get to 200 we will not be able to take anymore (would be nice to see that many here, but that's the number we cannot go over) due to fire and health and safety standards and regulations for the building.

Accommodation; this can be booked onsite or in nearby motels that are within an easy ten minute walk to the venue. Please make your own bookings by going directly to the motel you decide to book as we will not be doing any accommodation bookings.

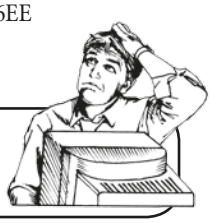
Forums; we have a great number of different forums for you all, ranging from home-brew gear, Radio Tek, Techno Club, APRS, QRP, Arduino, and how to design a low cost spy Satellite plus many more interesting forums for you.

AGMs; all the normal AGMs will be running with NZART on the Saturday followed by the AREC AGM. All other AGMs will be running Sunday morning and if you would like to book space for an AGM that you haven't notified us of, best do it sooner rather than later.

Alternative Programme; this is still in the planning stage but we hope to have it sorted by the end of February, but, by what we have got for you all to go and visit, I am sure you all will enjoy the days we have lined up for you.

I hope that this has given you a brief idea what we have planned for you all and we hope that we will see as many of you as we can at the conference here in Nelson in June.

Cheers everyone *Topsy Scott ZL2LS. Conference Secretary*



Next deadline for copy is
10 March 2012

A double sideband demodulator; the Mk3 squaring loop

by Mark A Pinfold ZL1BTB

QRP portable ops use DSB as it is power efficent and simple to implement; however a true DSB demodulation gives a 3 dB advantage over using an SSB set as a receiver as you don't throw away one sideband in the demod process; similarly BPSK is DSB but using digital modulation.

This is a double sideband suppressed carrier demodulator based on the "squaring loop" technique, the other technique is the Costas loop. It would make an excellent demodulator in a transmitter/receiver dedicated to reception of DSBSC signals.

For a more practical description of the theory, see my web url below for a description of the process. I have investigated a number of variations of the squaring theme and plucked the eyes out of them to make a more simple demodulator.

Below is the process of multiplying the DSB signal by itself, i.e same signal into the RF port and LO port of a mixer eg 1496, SBL-1, NE602 etc. and looking at the mixing products appearing out the IF port. Here is the process at 455kHz of a DSBSC signal modulated with a 1 kHz audio tone.

The photos show what happens; these were taken of a MC1496 in "squaring" mode. See the "squared product" at 910 kHz and the sidebands at twice the frequency spacing. The 910 kHz signal was not present at the input to the mixer. A simple way of looking at it is "two sidebands, 454 kHz and 456 kHz, add/subtract them together and you get 910 kHz and 2 kHz". We are only interested in the 910 kHz product!

For the actual DSB demodulator project I used an intermediate frequency of 921kHz, half of 1.84 MHz, because that was the frequency of the crystal I had and used as a filter. After having tried the DSB demodulation using the MC1496 and the divide by two layout, and also the Andren frequency doubler (RSGB *Amateur Radio Techniques* 5th ed) as a squaring circuit, (biased at 0.81 volts on the base); it gives 10db conversion gain ! I thought I would marry up the bits of circuits that gave the most performance gain with the least number of parts count and build up what I call the 'Mk 3 DSB demodulator'. Hopefully this will cut down the complexity of the circuit and enable a simple PC board to be produced.

I used the Andren frequency doubler (this works really well too) as a squaring generator as it gave the most gain to produce the DSB squaring output from the 921 kHz DSB supplied.

We now have to select the squaring product out of the mixer spectrum, as it from this product we will generate the injection "BFO" to use with the product detector. It needs a narrow filter, ie 600 Hz max bandwidth, to reject any modulation products.

The NE592 is an amplifier with a filter application and a crystal as the frequency selective feedback element; it is a circuit I stole from the internet and one that works well (see the Philips application note for this trick). It gave the most gain of 20 dB with the minimum parts count and frequency bandwidth of 200 Hz at the 10 dB points, which in this receive situation, will allow a moderate amount of collective drift (TX and RX) to occur before the circuit looses lock. This narrow filter enables one to pick the wanted carrier from the mixer(squarer) output at 1.84 MHz. I was not interested in ultimate stopband attenuation as I just needed the wanted signal 10-15 dB above the output crud so it could be easily used.

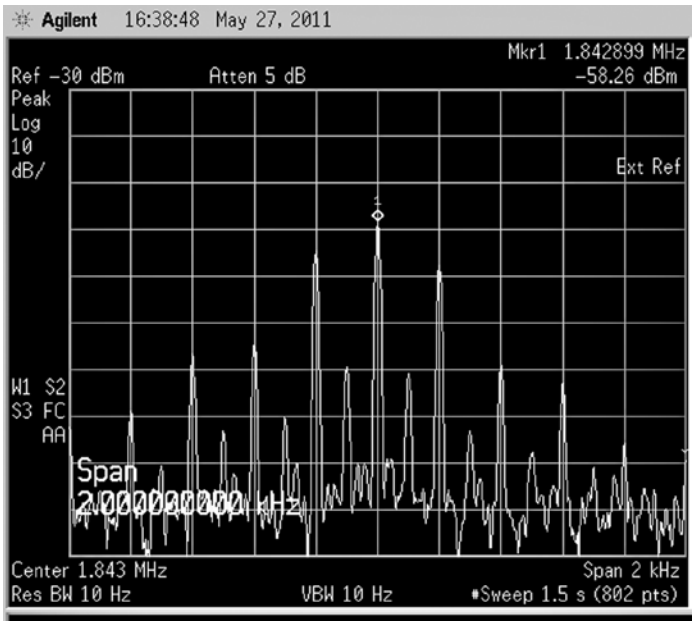


Figure 2. Doubler output spectrum. The mixing product appears halfway between the DSB sidebands, "squaring" the signal has synthesised the carrier! Also the sidebands at twice RF input (was DSB at 100 Hz modulation) and now shows 200 Hz spacing.

The filtered NE529 output was enough to feed the synchronous oscillator (also off the internet, Google® synchronous oscillator and read all about it, it's very interesting) and with its ability to lock to sub-harmonics, enables one to achieve a "divide: by two" function and at the same time derive a suitable level of RF output at the correct frequency for the NE612 product detector, thus killing two birds with one stone.

It was all made on a small double sided PC board as shown in photo 1. I used an inexpensive 1.84 MHz microprocessor crystal to achieve the narrow bandwidth to filter the wanted synthesised carrier; I'm sure an IF Frequency of 5 MHz or more will perform equally as well and enable a larger tolerance of drift in the receiver and still provide adequate demodulation performance. The strange thing is you can wobble the transmitted DSB frequency around rapidly and there is no change in demodulated audio pitch, unlike SSB. This is because you are deriving a wobbly

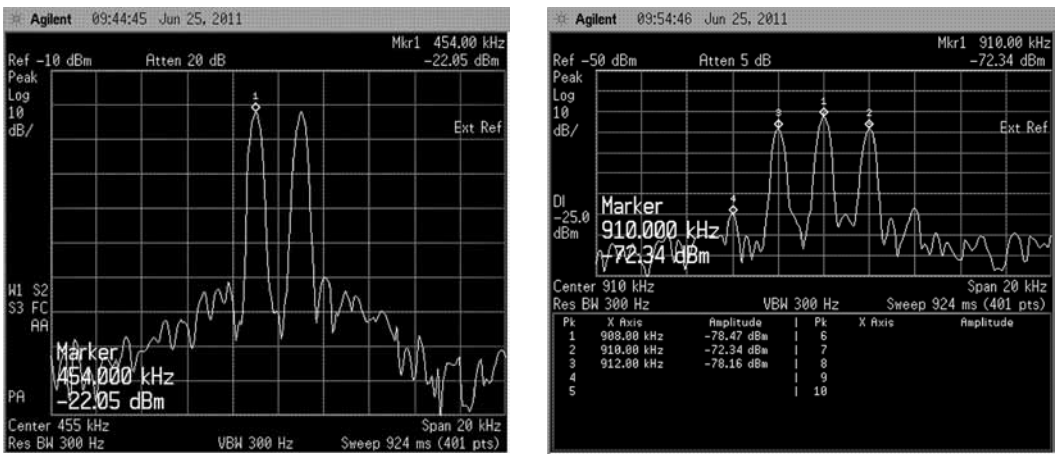


Figure 1. Input to squaring mixer LO and RF output of squaring mixer IF out.

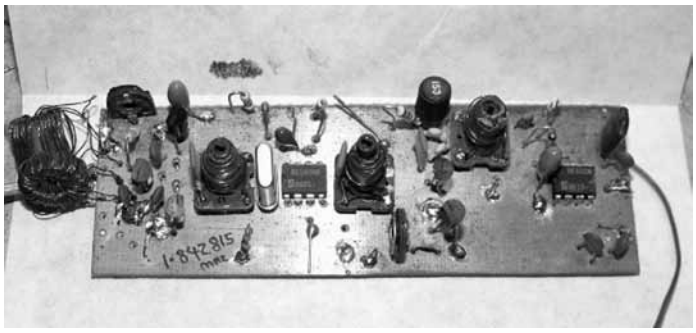


Photo 1. The finished product; (l>r) input transformer, squaring mixer, NE592, xtal filter synchronous osc, NE612 product detector.

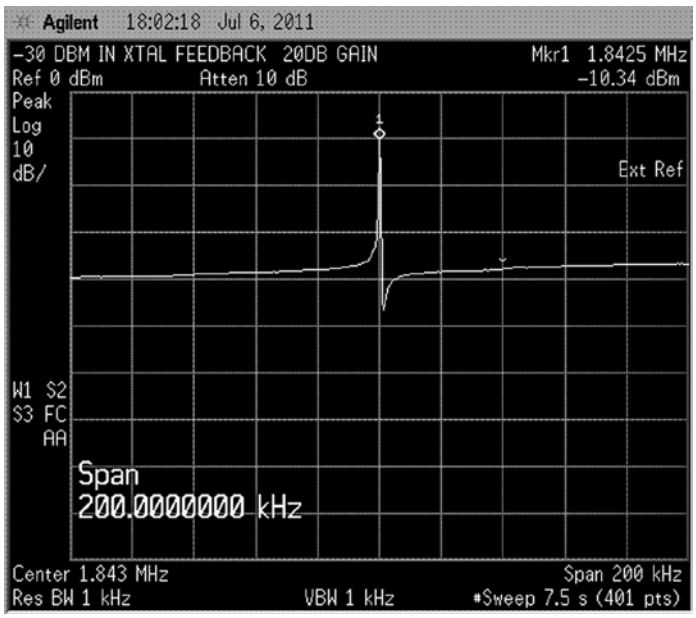


Figure 3. NE592 filter –amp frequency response.

BFO from wobbly sidebands. and the synthesised "BFO" will always be halfway between the sidebands, even if the sidebands move due to receiver drift.

The circuit rail was 12V however the DC feed to the NE602 had to be limited to 8V max with a series resistor and a zener diode bypassed with a tantalum polarised capacitor.

I am not sure of the input impedance of the frequency squaring circuit (the input transformer is a broadband trifilar random wound (23 turns) on a 15 mm toroid. I have transformed the 50 ohm signal generator output to 450 ohms to approximate a match for circuit evaluation purposes, with a homebrew 9:1 trifilar wound transformer. The transformer design could be somewhat more relaxed if I was running the circuit at 5 MHz rather than 1.8 MHz; perhaps a tuned input circuit with link coupling? The other minor inconveniences I had was the use of 6 mm Neosid™ slug-tuned coils requiring rather a large number of turns and capacitance to achieve resonance at such a low frequency; 85 turns of fine wire and 220 pF to get me near 1.8 MHz, and much larger values of capacitance to achieve resonance at 912 kHz in the synchronous oscillator. Whatever your final IF, the sync oscillator must operate at half the filtered frequency.

This demodulator was tested on a SBL-1 based DSB generator at -35 dBm and modulated from communications audio generated from my VX5 Radio listening to airport weather terminal forecasts on 128 MHz AM. All I had to do was tune the frequency of the 921 kHz synchronous oscillator to the half frequency of the 1.842 MHz IF so it locked. It worked very well and I was very pleased with its performance and quality of the demodulated audio.

This DSB demodulation board would be suitable for a low power DSB Transceiver, it would enable one to get a 3dB advantage in reception when compared to using a SSB receive system. Note: the same squaring technique is used to demodulate BPSK since it too is DSB.

Although the overall circuit may not be of use to you, some of the unusual circuits of the various stages may be of use to you in other applications.

I can be contacted if you have any questions on this project <pinfold@xtra.co.nz>.

The next DSB demodulator I want to try is the switching inverting alternate audio type which sequentially inverts the demodulated audio and thus assembles it in the correct sequence; the phase changes in the carrier RF at zero crossings on modulation, triggering the alternate switching action. This type was patented in 1957 (applied 1952) by Leonard Khan of AM stereo fame. He, of course, used valves!! And, if I get foolhardy, I may even try a Costas loop!!

Double Sideband suppressed carrier Demodulation Patents

These are all the references I can find on double sideband suppressed carrier demodulation; there are bound to be more, they are all US Patent Office registration numbers. The E ones are European Patent office. Have a look on the application of file dates and the Granting dates; some people had to wait a long time before their patents were granted.

2924706, 2992326, 2999155, 3047659, 3060383, 3088069, 3108158, 3141066, 3151217, 3252094, 3286183, 3345571, 3457513, 3537017, 3593149, 4253066, 4821322, 4475218, 4642573, 4862098, 2979611, 2397961, 4130839, 4430620, 4485487, 4510467, EP0291826B1, EP0293828B1, 2193801, 2276863, 2784311, 3375453, 3430151, 3719903, a novel DSB modulator.

References

- <http://www.amalgamate2000.com/radio-hobbies/radio/DSBsc_demodulation_by_the_squari.htm>
- <http://adamkar.republika.pl/spread_spec_rx_en.htm>
- <http://www.tapr.org/ss_g1pvz.html#part_two-receiver see squaring loop demod>

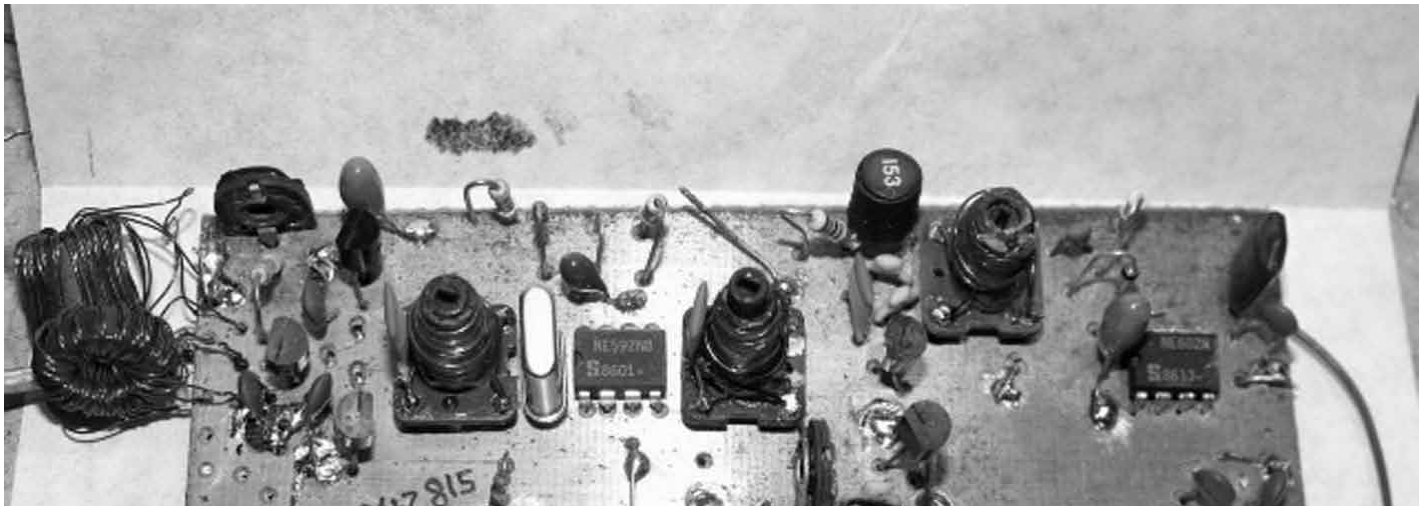


Figure 4. Circuit of the Mk3 squaring loop DSB demodulator.

Fan Dipoles for HF Applications

by David Conn VE3KL

(Reprinted from The Canadian Amateur, Nov/Dec 2010)

Introduction

This article presents design information about multi-band HF fan antennas, sometimes called parallel antennas. These antennas have a lot of merit with very few if any downsides. They are often used for portable applications and in places where there is not a lot of available space or towers. They can be constructed using a single mast with the dipoles acting as guy wires or connected to a self-supporting mast. Of course, if you have two radio towers the fan can be connected between the towers that already carry some other antenna like a Yagi. However, once the towers are in place the orientation of the fan is defined. In my situation, the towers are located along the North-South direction in the azimuth plane. A mast support allows you to orient the antenna in a preferred direction. Fan dipoles are extremely interesting and present us with many fascinating characteristics that can lead to other design concepts such as steerable fixed position antennas of moderate gain. Fan dipoles can be constructed with the elements mounted directly above each other (same azimuth angle, in-line), with the elements mounted at right angles to each other (crossed) or at any arbitrary azimuth angle.

(Note: This article uses TCA HotLinks to provide access to enriched media from the RAC website. For more information, please go to <www.rac.ca/tca.Nov/Dec>

The article contains a case study of one particular fan dipole that I have designed and tested at my cottage QTH as well as guidelines for designing other fan dipoles that might be of interest to you. The particular antenna that I use is a two element fan dipole for 40 and 17 metres that I use along with other home brew antennas that include a full size 2 element 20 metre rotating beam. The fan dipole was simulated with 4nec2x (see TCA Hotlink, 1) antenna software and measured with an Aim 4170 vector impedance meter.

The Basics

In principle, fan dipoles are simply a collection of half wave dipoles operating at different frequencies that are all connected together at a common feed point (see Figure 1). Hence, we expect to have antennas for different bands that perform very much like ordinary dipoles with respect to gain (approximately 6 dBi), bandwidth and impedance levels. This expectation comes from the idea that each dipole acts independently of the others with no mutual coupling. However, this is not the case and antenna current flows on all of the wires in the ensemble. The impact of this coupling which is strong for in-line dipoles is:

- The antenna pattern differs from that of an isolated dipole. For example, it is quite common for the maximum antenna gain to be at an angle of 45 degrees from the broadside of the antenna instead of broadside. In my application this turns out to be a great benefit since I want to have a strong signal in most of Europe.
- The impedance of the antennas differs from the expected value of approximately 70 Ohms for a dipole. The impedance is usually between 30 and 90 ohms (including 50 Ohms). This is well within the range of ordinary manual or automatic antenna tuners.
- The bandwidth is comparable to ordinary dipoles.
- Because of interaction between dipoles, a tuning strategy is usually required. I have not found this to be a problem. My strategy is to tune the highest frequency band first and then move to lower bands. For the case study used for this article, the resonant frequency of the antennas did not depend on each other which made the tuning extremely easy. It was accomplished in one step.

The Case Study

So, let's move directly into the case study. This example consists of two dipoles, one above the other

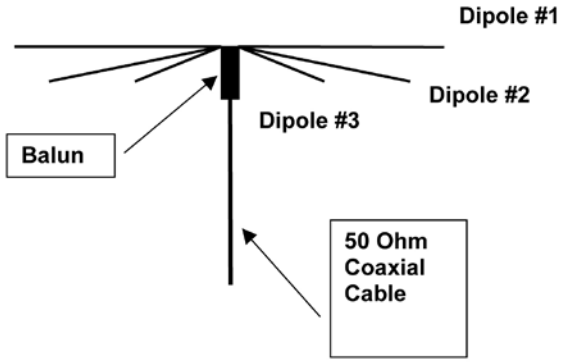


Figure 1. Block diagram of a typical fan dipole showing the side view. The dipoles can be arranged in any configuration with respect to the azimuth angle. In-line dipoles are arranged to have the same azimuth angle and hang one below the other. Crossed dipoles are set at 90 degrees to each other. Both types are commonly used and have different RF characteristics and beam patterns.

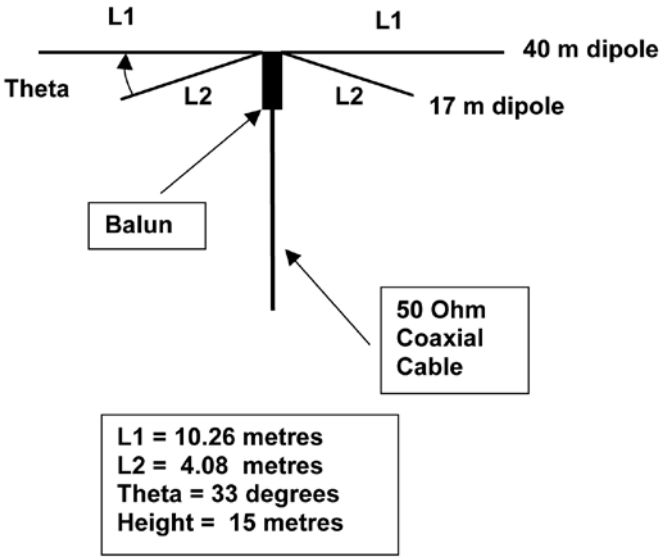


Figure 2. Block diagram of the 40/17 metre fan dipole used as a case study in this article. L1 = 10.26 metres, L2 = 4.08 metres and the height above ground = 15 metres.

(see Figure 2). The top dipole operates at 40 metres while the bottom dipole one operates at 17 metres. The impedance of a half wave dipole (not in a fan) for an antenna height of 15 metres is approximately 70 Ohms.

The bottom dipole in this case was first designed as a simple inverted V with an angle of 33°. A 33° angle for single inverted V antenna (not in a fan) produces an impedance of approximately 50 Ohms for an antenna height of 15 metres when mounted over average ground. This angle remained fixed in this study.

A photograph of the balun and wiring connections at the center of the fan is shown in Figure 3. The balun consists of five ferrite round EMI suppressors from Fair-Rite®: part number 2643540002. Notice that the wires are connected together with no separation at the center. Some references (see TCA Hotlink,2) recommend that the wires should be separated by approximately 10 cm to make tuning easier. I have not found this necessary for a simple two element fan dipole.

The Design Process

The design of fan dipoles should

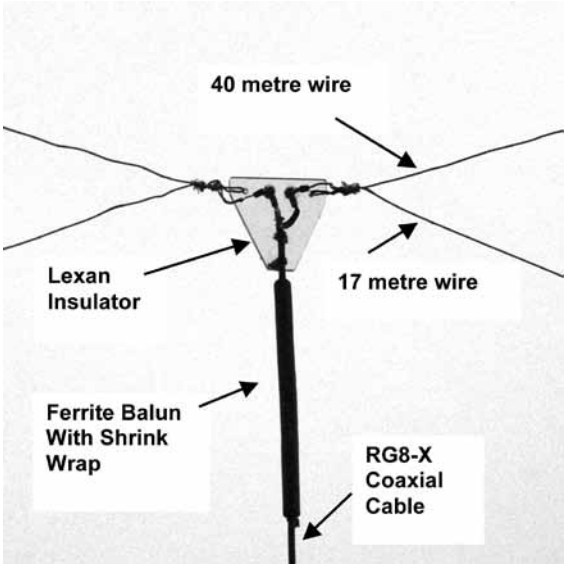


Figure 3. Photograph of the Balun and 40/17 metre antenna connections at its center.

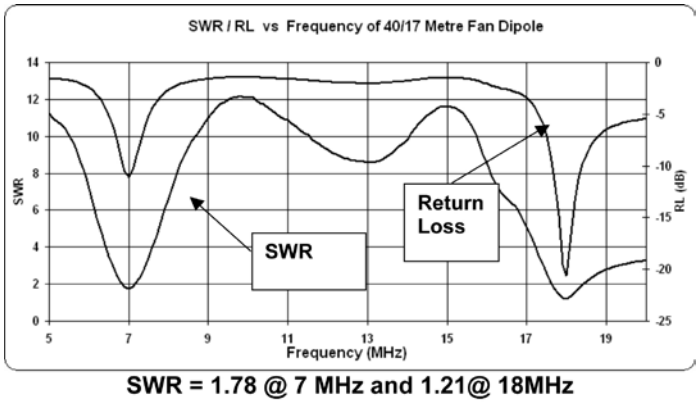
be based on antenna simulation because of the large number of variables being used, especially for configurations that employ three or more dipoles and ones that use different azimuth orientations for each dipole. Once the antenna is simulated and optimised for performance, you can then look at the polar plots and impedance levels to see if the antenna meets your expectations. Then the antenna can be built and tuned to the exact operating frequency of your choice. I build the antennas as simulated and then tune them slightly since the simulation is not exact and more than likely your model for the ground conductivity is not very precise.

For your convenience, I have included several 4nec2x files on my web site that you can download and change. You might want to use other bands such as 80 and 40 metres instead of 40 and 17 m that were used in this case study. Simply change the dipole lengths in the files for other bands. Also, I have included some other files that might interest you. These include a fan dipole that uses crossed dipoles instead of in-line dipoles. The results are quite different.

Results

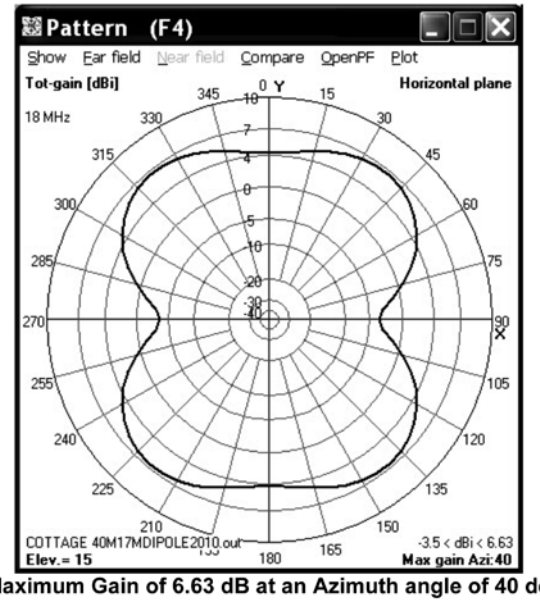
The measured values of the SWR and Return Loss are presented in Figure 4. These measurements were made at the input to a 20 metre section of RG8-X 50 Ohm coaxial cable that was connected to the antenna. The cable loss is approximately 0.8 dB. This means that the actual SWR at the antenna is slightly higher than those shown in the figure. For example, a measured SWR at the input to the cable of 1.8 means that the antenna SWR is really 2.0.

Notice that the antenna resonates at 7 and 18 MHz as required. The measured SWR at 7 MHz is 1.78 while the measured SWR at 18 MHz is 1.21. These are very good values that can easily be tuned with the aid of any simple antenna tuner. Generally, if the SWR is below 1.5, your solid state transceiver will work well without the use of a tuner, so this antenna is slightly above this requirement and I switch in the tuner for this situation.



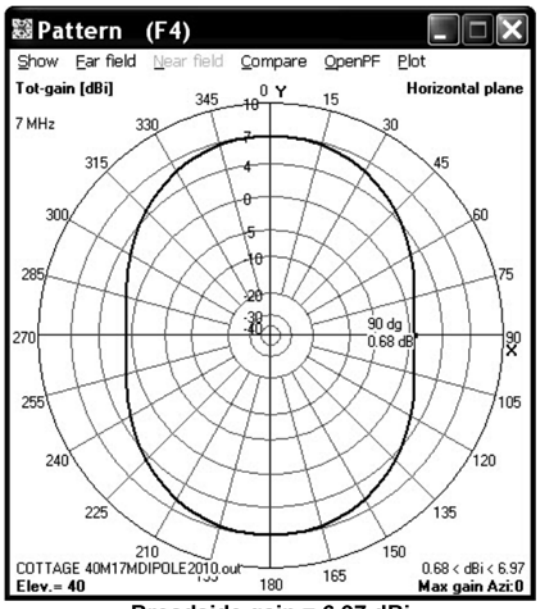
SWR = 1.78 @ 7 MHz and 1.21@ 18MHz

Figure 4. Measured SWR and Return Loss of the 40/27 metre fan dipole.



Note Maximum Gain of 6.63 dB at an Azimuth angle of 40 degrees

Figure 5. Polar Plot of the 40/17 metre fan dipole at 18 MHz.



Broadside gain = 6.97 dBi
Gain off the end = 0.68 dBi (similar to a vertical antenna)

Figure 6. Polar Plot of the 40/17 metre fan dipole at 7 MHz.

The simulated polar plots for this antenna are given in Figures 5 and 6. Figure 5 shows the horizontal gain for the 18 MHz case. Notice that a maximum gain of 6.63 dBi occurs at an azimuth angle at 40° (not broadside as might be expected). This gain occurs at an elevation angle of 15° making it an excellent antenna for DX communications. The pattern is starting to show four distinct lobes which indicates that a multi-lobe pattern can be generated by increasing the length of the top section. This is explored in the next section. The polar plot in Figure 6 indicates that the antenna acts like a simple dipole at 7 MHz which radiates off the broadside of the antenna.

Further study

The fan dipole appears to have many possibilities that have not been explored. One example of this is shown in Figures 7 and 8 for a 40/15 metre fan dipole. In this case, the top section is approximately three times longer than the bottom section which resonates at 21 MHz. That is L1 = 10.26 metres and L2 = 3.48 metres.

It is interesting to note that there are now four distinct lobes at 21 MHz with maximum gain values of 8.91 dBi at azimuth angles of 45,135, 225 and 315°. The gain of

continued on page 8

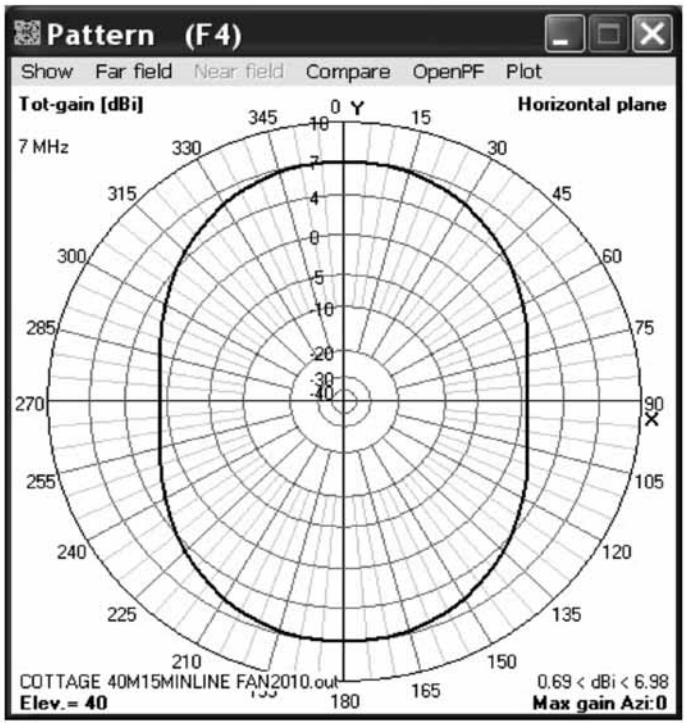


Figure 7. Polar Plot of a 40/15 metre fan dipole at 21 MHz.

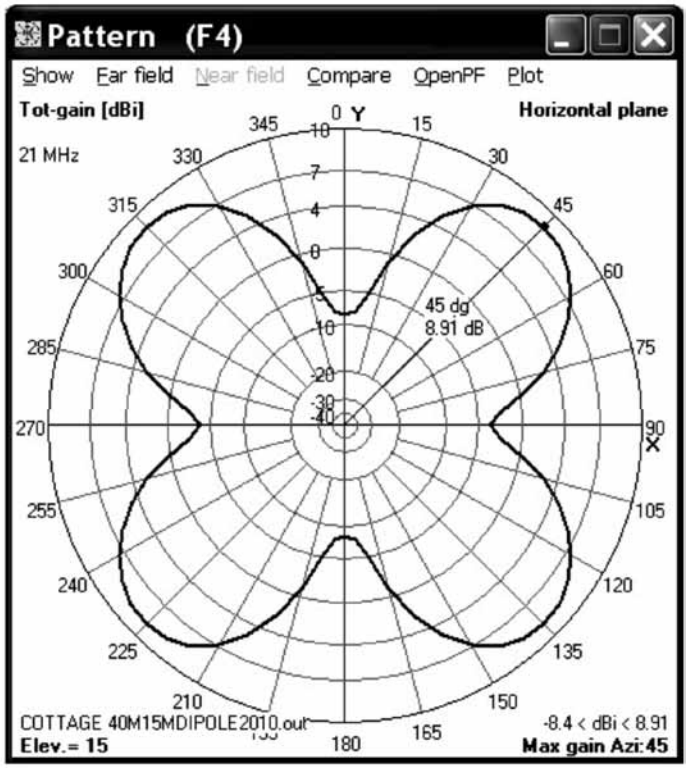


Figure 8. Polar Plot of a 40/15 metre fan dipole at 7 MHz .

◘ *continued from page 7*

8.91 dBi is approaching that of a 2 element Yagi which will be appreciated for those who are interested in DX. The pattern (see Figure 8) for 7 MHz is basically that of a dipole with broadside radiation.

Remember, if you use this antenna for field day operation, the antenna does not radiate broadside to the elements at the 21 MHz.

Conclusions and Guidelines

Fan dipoles have been around for a long time and are even commercially available. Several articles about fan dipoles have been published but there are many facets that have not yet been explored such as using them as part of a phased array. In fact when you look at the fan dipole carefully, it becomes apparent that a 2 element fan dipole is already a phased array with greater gain than a simple dipole. This leads to the idea of making two identical fan dipoles and orienting them at 45° with respect to each other. They could then be fed at different phase angles or switched in-out to produce some very useful patterns.

This article has presented a simple two dipole fan antenna that works on 40 and 17 metres. Other fan dipoles have been reported and built that contain three or four dipoles for operation on three or four bands. The main design/construction guidelines that I suggest are:

1. Start off with a simple two band fan dipole before jumping into more complex structures.
2. Keep the angle between the top and bottom dipoles close to 33° as this will keep the SWR fairly low.
3. If possible use a self supporting mast that you can experiment with in a safe fashion.
4. As usual, use a simple choke balun that is mounted right at the top of the coaxial cable.
5. Use an antenna tuner if the SWR is greater than 1.5.
6. Study my simulation files (see TCA Hotlink,3) to see what the trends are for these antennas. To my knowledge, these files types are not available on other sites.
7. Look at TCA Hotlink, 2 for some practical construction details.

Further Study Using TCA Hotlinks

Further information is provided with TCA hotlinks which are easily accessed via the RAC website. For this information, please visit <http:// www.rac.ca/tca>. Hotlinks make it unnecessary to type URL addresses into your computer and provide you with calculators and other support that demonstrates the ideas presented in the articles. The following hotlinks for this article are available on the RAC site.

TCA Hotlink, 1 <http://home.ict.nl/~arivoors/> Antenna Modeler by Arie Voors

TCA Hotlink, 2 <http://www.hamuniverse.com/multidipole.html> Multiband Fan Dipole

TCA Hotlink, 3 <http://ve3kl.com/> Link to VE3KL website

Until later, VY 73 David VE3KL

Addendum to David Conn's article in the previous issue of *Break-In*.

It was pointed out by a reader that the capacitor specification recommended for the surge protector circuit was not sufficient for real situations in either 120 V or 230 V regions of the world. After some research into this the author agrees with this comment. I would also recommend that you purchase an approved power line suppressor rather than build one if you are not an expert in this area. I have purchased a Tyco product (10VB1) for my 115 Volt system. It is rated at 10 Amps and has common mode rejection 45 dB at 10 MHz. Further information on this subject can be found in <http://www.ce-mag.com/archive/02/09/lamothe.html>.

Only capacitors rated "250 VAC." or "400 VAC" should be used. (The rating markings frequently use the "~" symbol for AC). A 2 kV DC Capacitors for mains-connected applications are specified to withstand very high pulse voltages at the 2.5kV level for 230 V systems and 1.5 kV for 115 V systems. In some cases, very high voltage DC tests are also performed. It is best to use X1Y2 type safety capacitors. Suitable capacitors usually have the logos of several Approvals agencies as well as their rating markings." For testing purposes, for 230 V a.c. mains a 10/50 microsecond impulse of 2.5 kV initial charge voltage is used. The X2 and Y4 types for USA/Canada are subject to 1.5 kV. βi

David VE2KL

WIA ANNUAL CONFERENCE
Mildura, 25-27 May 2012

Register online at <http://www.wia.org.au/>

ZLs are welcome at the WIA Annual Conference. If you are thinking of a break in Australia, why not include the WIA Annual Conference?

If you include Mildura at the end of your break, you can go straight to the NZART Conference in Nelson.

The Morseman

Gary Bold ZL1AN
<morseman@nzart.org.nz>

Pacemakers

My eulogy in the last column about Wilson Greatbatch, and his invention of the heart pacemaker, resulted in quite a bit of feedback. This from Bob, VE7BS:

"I have just received the November/December *Break-In,* and as usual your column strikes a responsive chord. In my own column, in September 2009 I wrote:

"Heart Pacemakers: Half way through preparing this column, my heart slowed down to 27 beats a minute. They whipped me off to hospital and within a few hours installed a Medtronic SENSIA SEDRL1 pacemaker. Three days later I was back at work on the computer, apparently 100% fit.

"I normally operate the rig sitting two feet or so away from the antenna switch, three feet or so from the MLA-2500 linear and the ATU, almost always on CW, lots of pulses. Does anyone reading QUA know of anyone having trouble from RF disrupting the pulsing of a pacemaker? Or anyone using one and completely trouble-free? The manual in effect says be careful about such things, but doesn't say it's an absolute no-no. I have come to rely on reader feedback for such things, and often get it in spades. There seem to be lots of radio amateurs on Medtronic's staff, but I haven't had time yet to talk to any of them. I am more than just curious.

"This gave rise to a whole raft of responses, including a photo of the first pacemaker and its power supply, mounted on a walker pushed by the patient, and an exchange of emails with Ralph Cameron, VE3BBM, who knew the inventor of it.

"My pacemaker is a "two-lead" version, the second lead somehow sensing the need for the heart to speed up when the body requires more oxygen. Medtronic uses Greatbatch's patents and sent me lots of information and specifications (including how to do the operation!) but I don't believe I have the actual schematic.

"The lithium-iodine battery must be truly remarkable. Mine is sealed into the implanted metal case, and has been working fine for more than two years so far. Just as well, as sooner or later the whole pacemaker will have to be removed and a new one connected to the sensor wires, which are routed down veins to the heart ventricles. A pity most batteries are much less reliable and long-lived!"

Fred, AA2KI, who is a medical doctor, in 1994 wrote an article called *"Pacemakers, Interference and Amateur Radio"*, which you can download as a PDF[1]. This is very informative. If you have a pacemaker, it's worth reading.

Why 50 Ohm Transmission Lines?

Periodically, somebody raises this question: "Why was 50 Ω chosen as the 'standard' characteristic impedance for the transmission lines we use around the shack? Sometimes we see 75 Ω lines too. Is there something 'magic' about these values, or are they just convenient round numbers?"

Some history: Coaxial lines didn't become common until after WWII, when war surplus supplies were released onto the US market. Before that, Hams used open-wire "ladder" lines, usually home-constructed, having characteristic impedances of 400 – 800 Ω. These were "balanced" lines, and could be connected directly to the opposite halves of whatever dipole radiating element we were using in the antenna. It was also conventional to use push-pull output stages, which are also balanced, and had the additional nice property of suppressing all even harmonics. We also often ran these lines with high SWR, which didn't matter, as the losses on open-wire lines are an order of magnitude lower than with coaxial lines. For example, the power lost feeding a 50 Ω load with 100 metres of line at 14 MHz is 0.23 dB for 600 ohm ladder line (SWR 9:1 at input), 2 dB for RG8 foam, 4.7 dB for RG59 (75 ohm), 5.6 dB for RG58A.

Coaxial lines are more convenient, since their grounded, shielding outer braid in principle confines the electromagnetic field inside the cable. They radiate less, and can be run close to conductors such as spouting. "Single ended" amplifiers, with multiple tubes in parallel for higher power, feeding the line through pi couplers for harmonic attenuation and matching became conventional, because they were simpler; though modern transistor finals have reverted to push-pull. Hi-mu toroidal coils have made them simpler too.

Coaxial line design

But using coax introduced new problems. The dielectric inside is unavoidably lossy, and absorbs some RF energy, generating heat. More heat is produced by ohmic losses in the shield and especially the inner conductor, which can't be conducted away readily through the insulating dielectric and outer plastic protective covering. The electric field inside also varies, being highest at the surface of the inner conductor. At high powers, the dielectric may break down at this inner surface, frying the cable.

It turns out that for given dielectric and conductor materials, and a fixed outer conductor diameter, the magnitudes of all these unwanted effects depend upon the ratio of outer conductor to inner conductor diameter. The characteristic impedance, Z_o, is proportional to the same ratio. In 1929, staff at the Bell Laboratories determined that

- for common dielectrics, lowest attenuation occurs when Z_o is 52–64Ω
- for highest power transmission to minimise heating, Z_o = 30Ω
- for minimising voltage breakdown at the inner conductor, Z_o = 60Ω

The selection of 50 Ω is generally considered to be a "round number" compromise between these different values. What about 75Ω? The feed impedance of an ideal centre-fed dipole in free space is about 73Ω so 75Ω was chosen as the other common value.

A Wikipedia article gives further detail[2], with a table of the characteristics of many cable types. For an exhaustive treatment of all cable types, with full mathematics, see the excellent book by Chipman[3]. For numerical calculations using a selection of both coaxial and ladder lines, see Kevin Schmidt's on-line calculator[4], which computes SWR, attenuation, and plots voltage and current along the line for arbitrary lengths and load impedances. But see my comment below in last month's problem solutions.

Keyers and the Bulldog Paddle

These days, microprocessor keyers are common and cheap. A chip for the one I recommend can be obtained from Bryan ZL1NI, and I wrote about it in the September/October 2009 column. This runs off 2 AA cells, implements autospace by default, and has only 3 other components. Figure 1 shows two alternate configurations for changing the speed between 7 and 30 wpm, one with the "classical" analogue potentiometer, the other with a push-button which changes the speed in 1 wpm steps, selecting the change direction by sensing which paddle is concurrently pressed. Bryan

continued on page 10

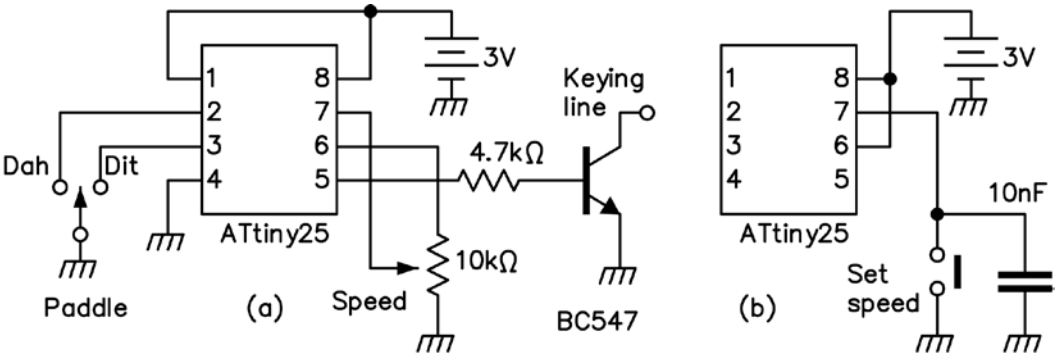


Figure 1. Two versions of Bryan's keyer.

continued from page 9

provides the programmed chips at cost. Currently this is $8 for the programmed chip posted anywhere within ZL. Email him to order at <akiwiham@gmail.com>.

But I'm often asked "where can I buy an inexpensive paddle to go with this chip?" You can't. There are many commercial paddles advertised on the web, but all are far more expensive then the keyer chip itself! The cheapest is the Bulldog paddle, which costs $32.95(US) from K9LU[5]. Indeed, it is made from a "Bulldog®" paper clip, and I was sent one for review 11 years ago – see the July/August 2000 column. I found it surprisingly useable up to 35 wpm, and web reviews were equally positive. That night, my subconscious mind designed a Kiwi homebrew version, and next morning, I built it. This took all of 15 minutes. See the photograph in figure 2.

I clamped a bulldog clip around the back of a small block of wood nailed to a baseboard, and pulled the handles around to the front. I stuck a drawing pin into the block inside each handle, and soldered wires to each. These are the dit and dah contacts. Two nails outside the handles serve as stops. A rubber band looped around the handles passes around two more nails, then behind the block to provide outward tension. The handles are already electrically connected, and form the common or ground terminal. To test it, I simply clipped the three wires to the Brown Brothers paddle I normally use and G-cramped the base to the front of the operating table.

While I was fingering experimental 'quick brown foxes', Tony ZL2VG started making exploratory peeps in the pass-band of my IC-701, then called CQ. We held a short ragchew, and I found that I could use this paddle perfectly satisfactorily. My home-brew version is sloppier, its wire handles are not as classy as the round metal finger-pads on K9LU's product, and rubber bands make somewhat crude springs. But it works, and again I can use it at 35 wpm.

This is the simplest and most successful low-cost home-brew paddle I've yet constructed (I have also used clothes-pegs, hacksaw blades, aluminium strips, micro-switches, reed relays). It was so simple I immediately made another, using a smaller bulldog clip. If you want to try an electronic keyer on the cheap, order Bryan's chip and make this paddle yourself.

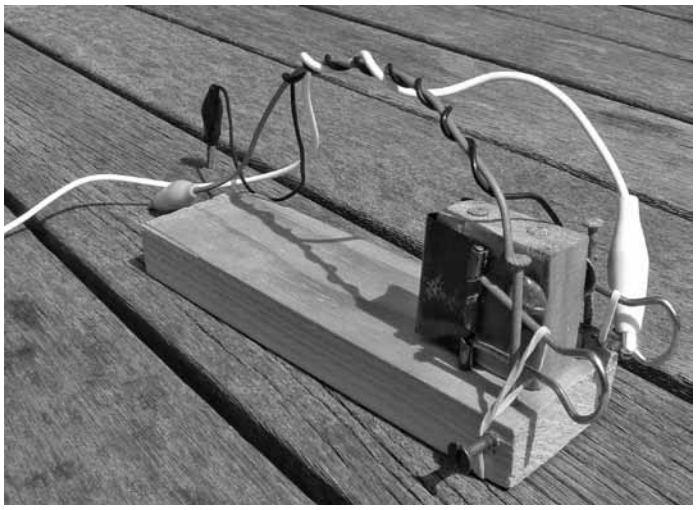


Figure 2. ZL1AN's version of the Bulldog paddle.

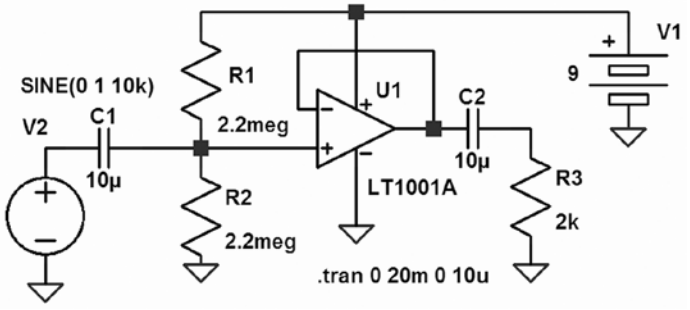


Figure 3. A software oscilloscope high-impedance input buffer.

A Software Oscilloscope input circuit

Ron ZL1AI downloaded the *Visual Analyser* software oscilloscope from the web[6]. This runs fine on his laptop, but computer sound inputs have input impedances which can vary from 600 Ω to 20 kΩ, much lower than a "real" oscilloscope, and too low to avoid loading some circuits to which they're connected.

The solution is to build an outboard, unity-gain, voltage-follower. Figure 3 shows the *LTspice* simulation of one using a sample op-amp the simulator supplies, but any modern FET-input type would do. This runs from a 9V battery, and has an input impedance of about 1MΩ. I've shown it feeding a load of 2kΩ a typical computer audio-input impedance. A limitation on using a computer oscilloscope is that the input is AC-coupled, with typical bandwidth limited to about 20 Hz to 20 kHz. The input voltage range is also limited, so you need a simple switched resistive attenuator at the output to examine higher voltages. Accurate calibration is another problem, but I'll leave that for another time.

Last month's problem

See figure 4(a). What are the input impedance and SWR? Line conditions repeat every half wavelength, so the length is equivalent to ¼. For such a line, the input and load impedances, Z_{in} and Z_L obey the equation.

$$Z_{in}.Z_L = Z_o^2 \text{ so } Z_{in} = Z_o^2/Z_L$$

Proceeding analytically, since ZL is reactive, complex algebra is required. Substituting, we find that $Z_{in} = 40 - j30\ \Omega$ the complex conjugate of the load impedance. Finding the SWR requires calculating the magnitude of the voltage reflection coefficient, which is one third. Using this, the SWR comes out to be exactly 2:1. Schmidt's on-line calculator[4] gives 2.01, slightly wrong. I must consult him about this.

Alternatively, you can use a Smith chart, and nice PDF ones which you can download are readily found by Google®. The solution requires finding the normalised load impedance point and rotating a vector drawn to it from the origin by 180°, and reading off the input impedance and SWR on the scales provided. Smith charts are somewhat perplexing, and being graphical, only give answers to "slide-rule" accuracy. it's easiest to use an on-line Smith chart based calculator such as Winsmith – find it with Google.

Correct solutions were received from Ron ZL1AI (analytic) and Alastair ZL2ARC (WinSmith calculator). See the solution on my webpage[7] for full details.

Last month's additional question

I asked, "how did they mute the audio during TV commercials?" Sandy ZL2KL emailed:

"I had such a device on my receiver 40+ years ago in Sydney. Basically, from what I can remember the TV channel added a pulse onto the signal that was used to alert/trigger affiliate stations that an ad-break was coming up.

"You could actually see this on the side of the screen as a little glitch. The remote TV station/repeater would then trigger and play their local advertising content during the ad-break. By utilising this pulse, a mod to your receiver allowed the

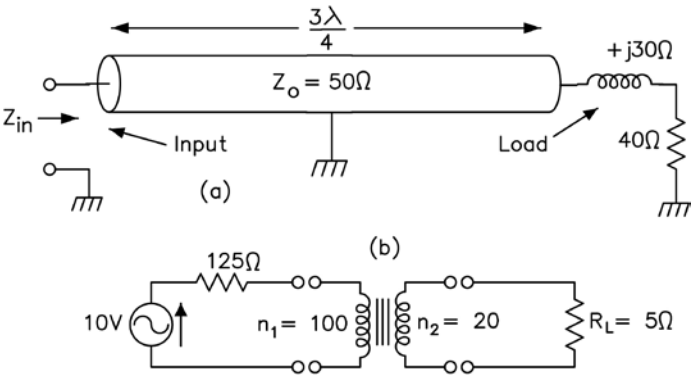


Figure 4. (a) Last month's problem. (b) This month's problem.

Magazine Survey

Compiled by Grahame Fraser ZL3SJ
<grahame.fraser@canterbury.ac.nz>

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p16 20m CW Transceiver (with ladder filter using 8MHz cpu crystals).

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audio to be triggered off until the programme re-commenced. Does this information help?"

The apocryphal story I heard of what happened in Auckland was different. It was said that commercials were inadvertently recorded and played on air with a slightly higher hum level. A rectifier/discriminator circuit could be adjusted to mute the sound whenever this higher level was detected. The TV people discovered this was going on, and fixed it. But nobody has verified this, and I never saw the device, so maybe it was just a rumour.

This month's problem

Figure 4(b) shows an ideal audio transformer having 100 turns on the primary and 20 turns on the secondary, connected to a resistive load of 5 Ω. The input is fed by a Thevenin source of 10V rms in series with 125 Ω.

What is the impedance seen looking into the primary of the transformer? What voltage appears across the 5 Ω load resistor?

References:

[1] See the Pacemaker article at <http://www.arrl.org/files/file/Technology/tis/info/pdf/jul94.pdf>
[2] Wikipedia coaxial cables <http://en.wikipedia.org/wiki/Coaxial_cable>
[3] "Transmission Lines", Robert Chipman, Schaum's outline series, 1968.
[4] Schmidt's transmission line calculator <http://fermi.la.asu.edu/w9cf/tran/>
[5] See the Bulldog paddle at <http://www.amateurradioproducts.com/>
[6] Download the VA oscilloscope from <http://www.sillanumsoft.org/>
[7] My webpage is at <http://www.qsl.net/zl1an/index.html>

Ham on Ice – the fulfillment of an engineer's ambition

by Kelvin Barnsdale ZL3KB/ZL5KB
Geospatial Research Centre, Canterbury University

In early 2011 I was asked by Gateway Antarctica, a research department of University Canterbury, if my group could build and support a geo-referenced video package for an instrument called the "HEM bird" which measures Antarctic sea ice thickness. Despite our group having no time or money, it was somewhere I had always wanted to go, so the answer had to be yes!

Although I had most of 2011 to build this equipment, procrastination and other work caused the project to be put together at the last minute, with most of the equipment being built in my garage. Actually it was two garages, as I moved house halfway through the build, having been "red zoned" in Christchurch.

The HEM bird is a torpedo shaped instrument suspended under a helicopter and flown across the sea ice at a height of 15m. It transmits a magnetic field which sets up an eddy current in the saline sea water under the ice, and the re-radiated quadrature magnetic field is detected by the instrument, giving the distance to the saline layer. My package was to catch a ride on the HEM bird by hanging like saddle bags around it, capturing video images of the sea ice below, and recording precise position and attitude of the bird.

Amateur Radio on ice

My trusty FT857D and wire dipole have come with me around the world and visited many exotic places, so I had to make plans to take them south as well. The first preparation was to ask Antarctic New Zealand for formal permission to operate from the Scott Base area, and a form was submitted. This was promptly returned with the required signatures of permission. The other job was to investigate a special call-sign for my expedition, and Debbie at NZART HQ quickly and efficiently arranged a ZL5KB call for me.

Most of the communications between Scott Base and the outside world takes place through a satellite data link, with backup on Iridium® phones. Local communication around the base is via several VHF repeaters, one being on Mt Erebus which dominates the local scenery, and VHF handhelds can be used anywhere across a radius of 50km of sea ice in McMurdo Sound. There are also extensive HF links for communication to outlying and deep field bases. The large American base of McMurdo has its own communications network. Fortunately, there is no cell phone network down there!

Getting acclimatised

Our flight to Scott Base was provided by Antarctic New Zealand on a USAF C17 Globemaster aircraft. The passengers have inward facing seats along the walls of the fuselage, with the centre of the aircraft occupied by large pallets of freight. Despite having to wear all the "extreme cold weather" clothing in case of a crash there was plenty of room to move around, and we could even go up to the flight deck for a chat with the pilots, which is a rare treat in these security sensitive days.

It takes a week or two to acclimatise to the Antarctic environment, and one major aspect is the dryness of the air, and static electricity. All phones have grounding plates which the user must touch first, as static discharges have been known to destroy phones or even take the whole exchange out. Dry skin caused painful splits in my fingers, but on the plus side any equipment or clothing brought in from the field dried out in minutes.

Acclimatising to the 24hour daylight is also difficult and takes several days, and yes they do adopt New Zealand daylight saving time down there! Working in the evening I would suddenly start to feel tired, and checking my watch showed it to be two in the morning. I came to realise that in normal life darkness has some influence on when we feel tired. Getting to sleep at night was very difficult too, especially in the early days there, in fact all the days seemed to merge into one very long day, and sleeps were like afternoon naps.

A total of around eighty people are in Scott Base; each does his/her chores in the kitchen on a rota basis, everyone washes their own plates, and loads and unloads the dish steriliser. Every Saturday there is a base meeting where we get allocated some small jobs to help keep the base running smoothly. All areas of the base are maintained at a constant 19°C, so we could move around in just tee shirts and shorts. The food provided by the base's resident cooks is fabulous.

A few days after my arrival at Scott Base I made acquaintance with the telecommunications technician Hayden Short. He was very helpful but relatively new to the position, and was still learning how all the systems operated. After checking that my transmit frequencies were not going to clash with the local HF channels, we discussed various amateur radio operating arrangements, including the use of a spare wideband vertical antenna they have on base.

In the end we decided it was better not to interfere with the existing equipment (if it ain't broke, don't break it), and we hung my 40m inverted V dipole on the tower above the base radio workshop. This gave access to a very comfortable operating shack with the feeder coming through the door joint, but the tower with its un-insulated steel guy wires of the tower were far from ideal, as they caused the antenna to be effectively shorted out and the resonant frequency went very high.

A King arrives

Early in our time there, the base had a visit from the King of Malaysia and his entourage, totalling around ten people. This was an important part of the trade negotiations between our two countries, so the base staff had to make a good job of accommodating His Highness. Being a Muslim, his meat had to be Halal which was impossible for the mess cooks to serve as all their food is shipped months in advance. The administrators side stepped this problem by making the menu vegetarian for the duration of his stay, and in the end all went very smoothly. By chance I had breakfast

EMbird ready to fly.

Good weather for travelling.

Drilling 3m test holes.

with the King, who turned out to be a really nice guy, and we had a chat about the South Magnetic Pole being in the general direction of north from Scott Base.

A shack of my own

I needed to find a place to operate away from the main buildings where I could put up the aerial on its own mast. A few days later I befriended the scientists Barbara and Cliff Evans who used a nearby hut for their research into Antarctic fish. They probably did not understand the concept of ham radio, but they agreed I could use the hut, and there was space outside for a small mast. There was one aspect of the hut that was very unusual for Scott Base; it had a window that opened, so the antenna feeder could enter the hut easily. Haydon found me a length of scaffolding, to which I added a 3m bamboo pole, making the mast a barely acceptable 7m tall. From this I hung an inverted Vee 40m dipole, the ends of which were attached to shovels in the snow. With the pole buried 1m into the snow, it needed no guys. There is a trick to make instant foundations down there: pour some water around the mast base and it freezes into a block.

At the hut there was already a tall mast carrying atmospheric instruments, and I thought about hooking my dipole to that. However, it was owned by an absent Malaysian science team, so I dare not risk upsetting all the past trade negotiations by breaking the instruments!

Back to work

Before the scheduled helicopter flights, we worked in the area of McMurdo Sound sea ice, moving around using Skidoos and measuring the snow depth, sea ice thickness and sea freeboard with nothing but a tape measure and drill, and some of these were long days. We completed forty three measurement sites over a 50 x 30km area; each with five ice measurements and sixty snow depth measurements. Many sites aligned with overhead passes of the CryoSat satellite which measures sea ice height from space, and our measurements acted as ground truth. As a safety check we had to contact Scott Base every hour when travelling on the sea ice, and when your watch is under five layers of clothing it is hard to keep track of time. Travel was mostly safe as the ice was around 170cm thick, but it could get quite thin near cracks, so extra care was needed when crossing them.

Me in Shackleton's hut.

EMbird overhead.

Penguins.

The video equipment I had built fitted onto the HEM bird instrument without drama, even though I had not seen the bird until I got down there, and as a result of last minute discussions I changed one of the cameras to be forward facing to see the horizon. Bad weather delayed the scheduled flights, and then we were delayed further by a cracked window in the helicopter, which demanded a special glue to be sent from the USA. Eventually everything came together and we had four good flights in two days of perfect weather. I was lucky enough to be "navigator" on one flight which gave fantastic views of the sea ice of McMurdo Sound, icebergs, glaciers and surrounding snow covered mountains.

First contacts for ZL5KB

The first night of amateur radio operations showed 40m was not a good band for working DX, but by listening around the 20m band appeared to be more promising. So the next night I shortened the dipole to operate on 20m, and worked Jason ZL3JAS in Christchurch, Ivan VK5HS, Brian VK2UT, an Argentinean and a German in Berlin. A few days later I heard two Americans talking on USB, so I politely butted in as I was sure they would appreciate a contact with the Antarctic. The first ham, NU1O was from Massachusetts, but did not seem excited with the contact with Scott Base. It turned out his colleague in the QSO, KC4USV, was operating from McMurdo Station, just 3km away from me! It is a small world.

Scott Base is an incredibly well run village, and New Zealand upholds all the conservation guidelines of the Antarctic Treaty. This demands that all rubbish and waste must be returned to its country of origin or home country for disposal. Even food scraps are shipped back to New Zealand, and an extensive recycling system is in operation throughout the base. The smallest of fuel spills must be contained and collected, even when it is just a few drops from the fuel nozzle. When you are working "in the field" you can only pee in a container and bring it back to base for disposal, and anything lost in the field must be recorded and reported, even if it ended up at the bottom of McMurdo Sound which is, by the way, 600m deep. Clean drinking water for the base is created by reverse osmosis of sea water, grey water is reused for flushing toilets and sewage is processed back to clean water and returned to the sea. One is always conscious that every litre of water uses electricity at each stage of the process, and hot water even more. The base has its own diesel generators but they have had little use since the three wind turbines were installed in 2009, and the base uses so little electricity that two thirds of the turbines power is passed onto McMurdo Station.

Contact with home

On my last night at Scott Base I made contact with my club Branch 05 in Christchurch and exchanged reports with Des ZL3AK and David ZL2ARY, with his son Oliver ZL3ODJ and daughter Rose ZL3REJ, also Andrew ZL3AJT. The highlight of the evening was to contact my two sons at the club, Liam ZL3LB, Aidan ZL3APB and with my wife in the background ZL3notyet. The club station was running 400W which made it easy for me, but they struggled to hear me with 100W on 20m and I suspect we could have done better on 15m, which shows the solar activity is improving.

Although work did not allow much time for Amateur radio during my visit, and had very few contacts, it was rewarding to contact "the outside world" from this isolated spot by radio, and gave me a sense of what it was like before satellite comms had taken over. The hut "owners" Barbara and Cliff became very interested in my activities there, and Cliff even started talking about getting his ham ticket. Spread the word.

The visit was an awesome experience, which is a word I rarely use, and I feel very lucky to have had the opportunity to go there. I hope to use the experience to show my school electronics club students what can be achieved in the career of electronic engineering, and ham radio. βi

Longer Wavelengths

Con Wassilieff ZL2AFP
<zl2afp@nzart.org.nz>

Antenna effective height measurements

Carrying on from the last column's theme of transmitting antenna measurements, where measurement of antenna impedance and RF current to the antenna was discussed as being important in determining the power going into the antenna, this time I will touch upon measurement of antenna effective height, this being important in determining the power coming out of the antenna. In an ideal world the effective height of a top-loaded vertical antenna would be equal to its physical height. Without top-loading, the antenna current distribution goes from a maximum value at the base through to zero at the top (where the current has nowhere to go). In the case of a quarter wave vertical the current distribution is quarter-sinusoidal, but with an electrically short vertical (where the height is very much smaller than the wavelength) the current distribution is just the top bit of the sinusoidal distribution (ie triangular). The effective height is related to the average current and hence is one half of the physical height. Top-loading moves the zero current point further away, allowing the current distribution to be more even along the length of the vertical section. Figure 1 illustrates the point.

The actual power radiated from an antenna with current flowing through the vertical section is given by the Ohm's Law relation I^2R, where I is the current in the vertical section of the antenna (measured with our RF ammeter from the last column) and R is the radiation resistance of the antenna, given by the relation[2]

$$R = \frac{160\pi^2 h_e}{\lambda}$$

where λ is the wavelength, and h_e is the effective height of the antenna. This relation is valid only for electrically short antennas, where the height of the antenna is very much less than the wavelength ie. $h_e << \lambda$. This is generally the case for amateur antennas at the lower frequencies. Of special interest is the square law relationship of R with the effective height. Doubling the effective height (such as by adding significant top-loading) results in a four-fold increase in radiation resistance and hence a 6dB increase (one S-point) in far field strength (at least in theory).

In the real world there are many other factors that reduce the effective height, the main one being proximity of the antenna to electrically conducting objects (trees, buildings etc) that affect the distribution of electric flux lines around the antenna. These have the effect of "raising" the ground level.

A short vertical antenna is coupled to the ground, and surrounding trees and buildings. Although it is not immediately capacitively obvious, these surrounding objects have a resistance to ground that is in parallel (not series) with the main path to ground. Figure 2 shows a simplified model of this situation with a top-loaded short antenna capacitively coupled to a tree, and to the ground. Each of these two capacitances form a return path for the antenna current. The path via the tree is an additional path for current to flow and so the total

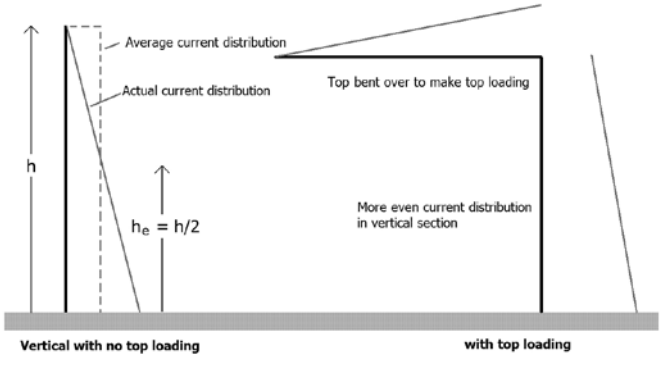

Average current distribution
Actual current distribution
Top bent over to make top loading
h
h_e = h/2
More even current distribution in vertical section
Vertical with no top loading
with top loading

Figure 1. Vertical antenna with capacitive top loading.

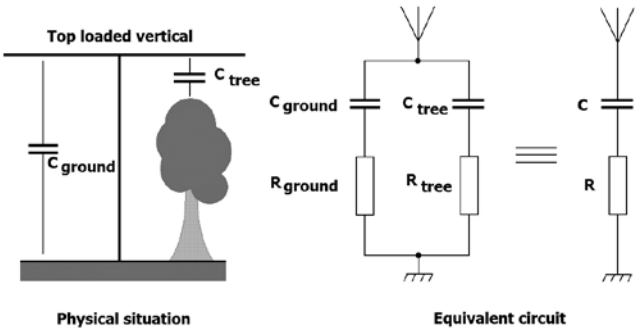


Figure 2. Antenna model, showing environmental loss paths.

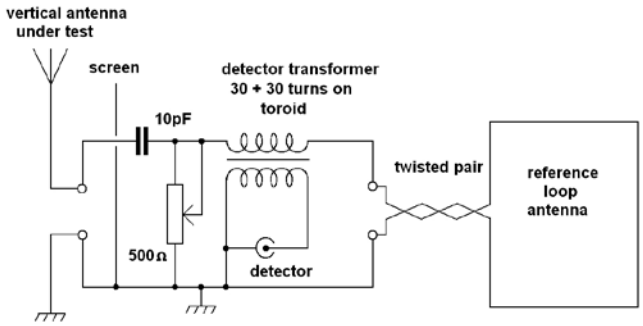


Figure 3. Antenna effective height bridge.

resistance will always be higher that R_{ground} alone.

This simplified model does not give any indication of the effective height of the antenna but intuitively it is easy to see that the presence of the tree "shades" the antenna and reduces the effective height. In practice all of the parameters must be physically measured. Perhaps the one exception is the antenna capacitance C_{ground} which can be estimated on the basis of an elevated wire having a capacitance in the order of 5pF per metre. In practice it is not easy to separate out the capacitance and resistance due to surrounding objects, but the further away is the antenna from trees, the lower will be the capacitance C_{tree}, and hence R will be closer to R_{ground}.

The antenna capacitance and resistance can be measured with the impedance bridge described in the last column, and by an iterative experimental process (ie playing about with moving the antenna around!) a reasonable estimate of C_{tree} and R_{tree} can be obtained. As C_{tree} tends to zero the effective height of a top-loaded vertical antenna should approach the physical height.

A simple method of measuring the effective height of an antenna was described in "LF Scene" back in March/April 2001 issue[2]. This involved a simple bridge circuit which is reproduced in figure 3. This bridge compares the open-circuit voltage from a reference loop antenna with the open circuit voltage from the vertical antenna. The loop antenna is sensitive only to the magnetic field which is not greatly influenced by surrounding objects, unlike a vertical antenna which is sensitive to the electrical field. Because the voltage from a short vertical antenna is 90 degrees out of phase with the voltage from the loop antenna, a 90 degree phase adjustment is necessary before a null balance can be achieved. The voltage divider formed by the 10pF capacitor and 500 ohm variable resistor does both.

Once a suitable LF beacon has been tuned in and the reference loop in the vertical plane oriented for maximum signal, the vertical antenna under test is connected and the resistor is adjusted for a null balance. The resistance is then measured and the effective height (in metres) determined using the following relation:

$$h_e = \frac{3310 \times A \times N}{R \times C}$$

where A is the area of the loop, N the number of turns, R the resistance in ohms at balance, and C is in pF (in

this case 10). In my present installation the antenna is 6m tall, but the effective height was measured to be only 3m. Some work needed there.

New digital mode for LF/MF

From the author of the ROS mode (at least I think he is one of the authors) comes a new digital mode called OPERA. Details of the mode's protocols (such as the encoding, error correction, synchronisation etc) are currently shrouded in secrecy so the only descriptions are such as have been gleaned from the publicity blurb and the comments of other amateurs who have had some experience with the new mode.

It is described as *"OPERA The new CW/ QRSS replacement data mode"*. It is basically a single tone, on/off keyed QRSS with very long key down symbols. In fact the symbols look exactly like conventional morse code, only with very long symbol times. Forward error correction appears to be applied as up to 33% of the message can be lost before decoding fails.

Opera is intended by the author(s) to be an alternative to the QRSS transmission system and provides for a limited number of characters to be transmitted by a serial single keyed tone. As of the writing of this column it has a beacon mode only, providing for something like six characters.

There are various speeds provided, with transmit times used to describe the particular mode in use. New speeds have crept in over time and new versions of the program seem to pop up every other day. For example, Opera 2 has a 2 minute transmission time, Opera 8 has an 8 minute transmission time, right up to Opera 65 which has a 65 minute transmission time! As there are a fixed number of symbols in each transmission block, the symbol time will vary with mode selected.

Opera 2 appears to be popular on the 500kHz band with Opera 8 on the 136kHz band. Transatlantic reception between the USA and Europe has already been confirmed.

Many amateurs have asked for details of the coding protocols so that it would be possible to develop PIC micro (hardware) transmitters for the mode but the author(s) seem very unwilling to divulge any details whatsoever. Even though the mode is still under development, such secrecy is totally unwarranted given that the mode has been designed solely for amateur use. If it was a commercial package that was incidentally used by amateurs it would be a different story, but my opinion is that closed protocols have no place whatsoever in amateur circles. Once a mode has been made public, at least its protocols should be made public knowledge. No way will this mode be legal in the USA, if the present level of secrecy continues!

By all accounts though, the new mode does seem to be popular in the UK and Europe area, particularly with amateurs who have more interest in using the mode for DX'ing rather than be concerned with its innards. I for one will not be going near the thing until it becomes a bit more "open source", although I am not going to hold my breath!

600m net

The Thursday evening 600m net has gone into recess over the December-January period, due to the longer daylight hours and lack of useful propagation. Although for lower band signals the ionospheric E or F layers are highly reflective 24 hours a day the daytime D layer does not disperse until after sunset and absorbs the sky waves on their way to and from the E and F layers, resulting in greatly weakened signals. The net will resume on the 19th of January on 3666 kHz starting at 8.30pm.

136 kHz

There has been some activity in VK, with many stations operating mostly QRSS3. There have been no reports of reception of VK signals here in ZL.

However, there has been significant 136 kHz activity in the UK/ Europe area, with transatlantic reception becoming frequent, although two-way QSO's seem to be via reception by distant "grabbers". A "grabber" is a (generally unattended) station receiving via Argo or similar QRSS receiving program, with results posted to the internet at frequent intervals (typically 5 or 10 minutes). There are dozens of such grabber stations around the world. It is a very handy way of seeing (literally) whether your signal is getting out there.

References

[1] "LF Scene", *Break-In* March/April 2011

[2] *"NDB Antennas"*, Nautel Ltd, 2002

IARU – International Amateur Radio Union

Liaision Officer: John Lochhead ZL4QS
Liaision: Terry Carrell ZL3QL
Stuart Watchman ZL2TW, Peter Lake ZL2AZ

Well, we are now into 2012, another year of amateur radio and I trust you all have had a good Christmas and a happy new year and Santa has fulfilled all your wishes.

During the latter part of 2011 the IARU Committee has been working on getting a suitable person to be appointed the Administration's delegate to attend the WRC 12 conference to be held in Geneva from the 23 January to 17 February 2012.

What is a World Radiocommunication Conference (WRC)?

Organised by ITU-R roughly every four years, it is a Conference to review, and, if necessary, to revise the Radio Regulations: the international treaty governing the use of the radio-frequency spectrum and the satellite orbits. WRC-12 takes place in Geneva from 23 January to 17 February 2012 and will be followed by one in 2016. The basis of work at the Conference is the CPM (Conference Preparatory Meeting) report resulting from the work of ITU-R Study Groups and the inputs from countries. A variety of spectrum-related matters dealing with the future development of radiocommunications, enabling convergence and coordination of all radio services, were addressed by the Second Session of the Conference Preparatory Meeting (CPM11-2) for the 2012 World Radiocommunication Conference (WRC-12). CPM11-2, which met for two weeks, concluded today with the adoption of the Report to WRC-12, focusing on technical, operational and regulatory materials to be considered by the Member States of the ITU in developing their proposals to the Conference.

More than 1100 participants from 109 ITU Member States and 69 Radiocommunication Sector Members attended the meeting.

The forthcoming WRC-12 will be held in Geneva from 23 January to 17 February 2012. World Radiocommunication Conferences are mandated to review and revise the Radio Regulations, the international treaty governing the use of radio-frequency spectrum and satellite orbits.

WRC-12 will facilitate the future management and use of these scarce orbit/spectrum resources in the interest of end users, with global implications for both policy-makers and the industry.

The committee has recommended to NZART Council that the NZART ALO Don Wallace ZL2TLL would be the most suitable person to fill this very important role. Don will sit alongside our Administration at Geneva and the committee is confident that Don will be a tremendous ambassador for NZART and the Amateur Radio fraternity in New Zealand. By the time *Break-In* reaches your mailboxes Don will be well involved in WRC-12 activities

The IARU R3 Conference will be held in Ho Chi Minh city in Vietnam. I suspect the 15th IARU R3 Conference will be held around the second week in October.

With this in view the committee is calling for authors of papers suitable for inclusion on the agenda of the conference. If any amateur wishes to draft a paper then I would be pleased to receive them at my email address <jlochhead@xtra.co.nz>. Any paper received would be put before the committee and NZART Council for approval so they can be included in the IARU R3 Conference agenda.

NZART in the past has been very active in this important area and I would like to see us continue our fine record of leading IARU Region 3 in October.

John Lochhead ZL4QS
NZART IARU Liaison Officer

Next deadline for copy is **10 March**

Digital Modes

Murray Greenman ZL1BPU
<zl1bpu@nzart.org.nz>

It's amazing how the months fly by! Now we have a New Year and time to write about Digital Modes again. I have been writing the column now for some 15 years or so, but that's nothing compared to the amazing efforts of our learned friend Gary ZL1AN and his Morseman column.

Tag Tricks

I promised last time to expand on some of the techniques used to recover data from RFID tags. The HDX type tags transmit a weak FSK signal, and since the FSK is fairly wide (to cope with signal drift and chirp) this can be received with nothing more sophisticated than an FM receiver chip. These days however the receiver is usually just a tuned limiting amplifier, followed by a micro measuring the carrier signal period.

The FDX type tags 'transmit' by loading the transmitter signal, and it can be very difficult to recover the signal (often just using an AM demodulator, but preferably from a return loss bridge) because it can easily be much smaller than the hum and noise on the transmitter power supply and carrier envelope. The best way is to use a synchronous mixer, clocked by the transmitter signal, so the hum and noise products (which are asynchronous) are largely eliminated. I developed and patented a technique using a Royer transmitter (see later) where the transmitter FETs served as the mixer, so the transmitter also acted as synchronous receiver. An additional choke in the Royer stage supply was tuned to recover the baseband signal. Performance was substantially improved.

The baseband (ie demodulated) data is invariably Manchester coded (the data is in the edges, rather than the levels) so that DC bias and drift effects are eliminated. Once decoded using the recovered clock, you end up with a continuous stream of data bits, which could contain any amount of noise, and certainly will before the tag transmits and after it has finished. The tag transmits the same frame of data over and over, typically 5-10 times/second, and the frame starts with a preamble, a specific group of bits in a pattern that is easily recognisable.

The micro discovers the pattern using the preamble, and then collects the following bits as a block (there is always a fixed number), and discards any others until the next pattern is found. Within the block there are fixed bits that are always 0 or 1, and other bits that represent checksums for parts of the pattern or the entire pattern. The early receivers simply kept checking each received block until it got one in which all the check bits and checksum agreed with the message, at which point it passed on a correct tag ID. The trouble is that when reception is really noisy (which is almost always), the chances of getting a complete tag frame are not good.

Non-coherent averaging

The better RFID receivers use non-coherent averaging (remember I talked about that some months ago in connection with grabber images and MEPT signals). What they do is average the received data frames bit-wise (every bit in the frame averaged continually with the same bits from previous frames). Thus at some point you'll get some averaged bits bigger than 0.5, and others smaller, but rarely close to 0 or 1 due to the effects of noise. The beauty of this technique is that the data detector need not start with 0s and 1s either; you can use analogue or 'soft' bit decisions to feed the averaging process and gain further useful sensitivity.

Once the average has been accumulated, the receiver 'slices' the average, turning bit averages greater than 0.5 into 1, and those less into 0, like a software equivalent to the RTTY slicer. It then uses this new bunch of 0s and 1s as though it was a newly received frame, and does the checking on that. It turns out that in noisy conditions this technique comes up with the correct tag ID far faster than waiting for a complete frame, since the noise generally knocks out different parts of each successive frame. Of course you can have a dollar both ways, by checking the incoming data each time you collect a frame, as well as checking the average. We also implemented a simple error rate meter by reporting what proportion of frames resulted in a correct decode.

Other tag types

There are many different types of RFID tags. I've so far discussed only those I know most about; the LF livestock, companion animal and security tags. There are also some tags operating at 13.56MHz, and still more at UHF frequencies. Most of the retail security tags aren't ID tags at all, they simply contain a 13.56MHz tuned circuit which is detected by the receiver (like a grid-dip meter) at the shop door. Some have a diode frequency multiplier to aid detection. The small rectangular tags with a printed bar code (typically attached to CDs and DVDs) contain two amorphous metal strips, which generate harmonics when excited by RF.

Some of the UHF ID tag types are active (they actually transmit), although these are mostly used for toll road applications. Passive (RF powered) UHF types are frequently used in situations where there can be many tags in the same area. They consist of a chip in the centre of a flexible PCB dipole about 60mm long and operate at 2450MHz.

QRM from other Tags

As you can imagine, if two conventional tags (either HDX or FDX) are in the field of the reader at the same time, it can become very confused. In a word, you either read one tag, or the other, but most of the time a mixture of both and so neither. There was a situation some years ago when an over-enthusiastic organization double-tagged some small wildlife ('to be sure they could be read'), and the result was that none of the double-tagged animals could be read at all!

Where the tag data rate is high (as it can be with the microwave tags, since the bandwidth is greater), the tag protocol can be much smarter, using data sent to the tags. Here, the reader controls the tags by selecting groups of serial numbers, so that they transmit on command, which means that the reader can successfully read all tagged items in a box, all books in a pile (as in many newer public libraries), or all cyclists reaching the finish line at once in a road race.

Royer transmitters

George Royer described the push-pull inverter oscillator in 1954[1]. He used a saturable reactor core. It has high efficiency, with square wave output. Most of the inverters in early radio-telephones were of the Royer saturable reactor type. Some of you will have fond memories of the black AWA inverters using 2N441 Germanium transistors, which put out 100W at 500V and 250V, and used a split toroidal iron core. Modern examples include CCFL computer backlight supplies, DC fluorescent lamps and high-efficiency lamps.

In some recent implementations (confusingly still called Royer oscillators), the transistors operate in Class E. The transformer is a non-saturating resonant tank, and there is a choke in the common supply to the transformer centre-tap, which series resonates with the tank and transistors at the second harmonic. The output is a beautiful sine wave, and the transformer centre-tap has a

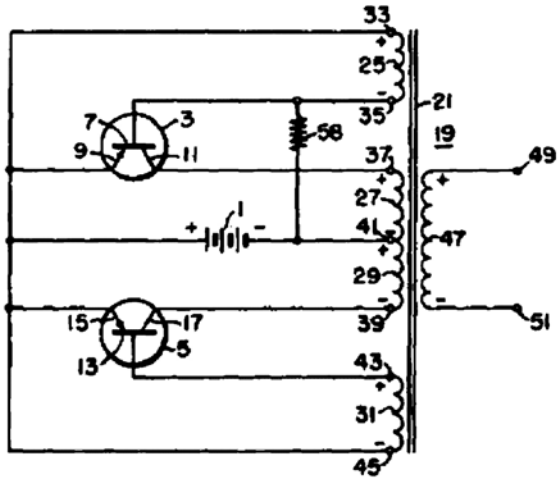


Figure 1. The original Royer Oscillator.

lovely sine squared waveform at twice the frequency and peak amplitude twice the power supply voltage. The efficiency is very high (well in excess of 90%), but the secret to success is getting the transistor conduction angles correct (as it always is with Class E). Generally therefore it is still operated as an oscillator, rather than a driven amplifier.

There's a very good article about inverters by well-known engineer, the late Jim Williams, which includes an appendix about Royer and his original design[2]. The designs in this article are true Royer designs. The choke you see in the transistor emitters is a switch-mode buck regulator choke used to control the supply voltage and therefore the output voltage.

More MEPTs

I have previously mentioned the excellent QRP2000 synthesiser designed by Tom DG8SAQ. This uses the Silicon Labs SI570 fractional-N synthesiser, and uses a micro with a USB stack, so the little unit is both powered and controlled via a USB port[3].

The kit is intended for use with the SoftRock and other SDR receivers. However, at my prompting, Tom has come up with a new version of the software, which will operate as a MEPT. In the latest release[4], he has includes two especially important features: it now transmits at precise 10-minute intervals (or whatever interval you select), ideal for 'stacking', and it includes hardware PTT control!

The Si570 chip can't be turned off in the way a DDS synthesiser can. Previously you had to send the transmitter to some harmless frequency when the key was up, and that led to stability problems, since the heating in the Si570 chip depends on the operating frequency. It also caused unnecessary heating in the transmitter and could cause unwanted interference. Now, with PTT control, you can leave the synthesiser running on or near the operating frequency, so the chirp and drift are much reduced, and the key-up signal is not transmitted.

I am using the QRP2000 with a tiny transmitter first published by N7KSB[5],[6]. This very simple transmitter uses a single CMOS chip as a Class D amplifier, and it can produce 500mW at any frequency up to 30MHz. In my adaptation (Figure 2) I have dispensed with the crystal oscillator, and use two of the spare gates as a high gain amplifier and limiter, so it will operate with quite low-level drive. I operate it at 6V and it puts out 100mW, just right for a MEPT. It stays rather cooler at 6V, which is more appropriate for long-term use.

In this picture, the input from the QRP2000 (built in a similar box) is on the right, and the output is at the left. The single chip (a common 74HC240) is in the centre. Since the photo I have added a 6V regulator and a PTT input socket.

In Figure 3, you can clearly see three transmissions, as received by ZL2IK in Northland[7]. The top one, in slow CW, is ZL1BNG (Hamilton). The next one down is my 'conventional' MEPT, which sends a WAV file using an SSB exciter. Below it, you can see the signal from the new QRP2000 synthesiser and N7KSB transmitter. Both of my transmissions are 100mW, but the received signal strengths differ because one has a vertical antenna, the other a dipole. Note how they are transmitting exactly in step with each other.

You may not see it in the published picture, but there's a fourth signal visible on this grabber image, just below my lower one. It's an FSK transmission from G0PKT, which is often very good copy at night.

The Other IP

Not "Internet Protocol" or "Intellectual Property", but Intermodulation products – you've probably heard the terms IP2 and IP3 in relation to receiver performance. While on the subject of MEPTs, here's an example that illustrates intermodulation very clearly. The E-layer propagation on 30m recently has been amazingly strong. For the last many years, my signals have mostly been 'in skip' at ZL2IK, and barely visible, if at all. Now things have really changed, and during the day the signals are very strong, so strong that intermodulation effects can be clearly seen (Figure 4).

I must stress that what you see here is NOT the fault of Peter's receiver, but more a matter of how the AGC responds to slow changing signals.

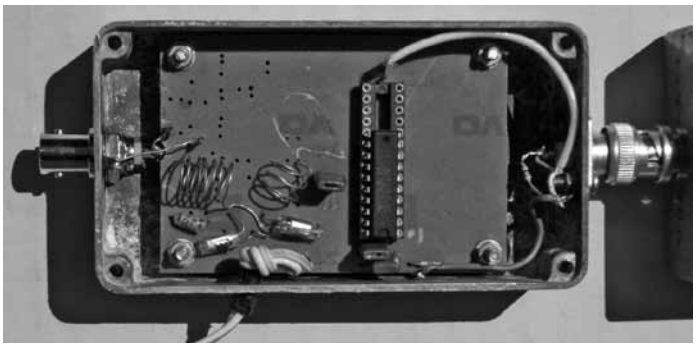


Figure 2. Very simple MEPT transmitter.

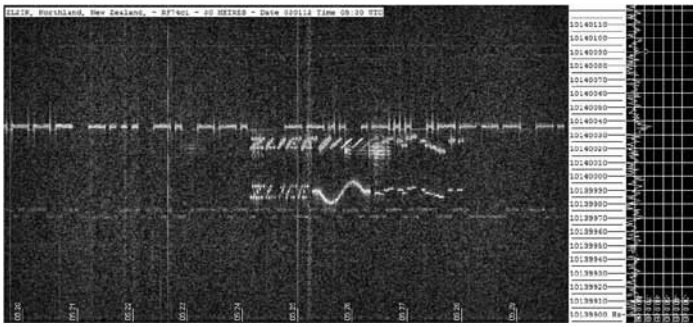


Figure 3. MEPTs on 30m visible at ZL2IK.

The AGC changes receiver gain and modulates one signal with the other. You can see here that the signals are far stronger than in Figure 3. Look at the start of the lower ZL1EE signal; you should see that it is mirrored above the ZL1BNG signal, at an equal distance above as the real signal is below. The mirrored signal is inverted, and only present when the ZL1BNG key is down. This is a simple case of one audio frequency mixing with the other to produce an image.

If you look even closer, you'll see on the other side of the ZL1EE signal (lower) another product, which is the correct way up, but is twice as tall. This is a result of twice my frequency mixing with the ZL1BNG signal frequency. I am fairly sure that both of these effects are audio artefacts due to AGC action in the receiver or PC software, and nothing to do with the front end of Peter's receiver. The products are of course much weaker than the real signals, and only visible when signals are very strong.

The other (upper) ZL1EE signal in Figure 4 illustrates another effect – intermodulation at the transmitter! This transmitter has a 100mW linear amplifier, and is driven by a complex audio signal with multiple tones and raised cosine envelopes. All that splashy stuff above and below the signal is transmitted intermod. It is of course well down on the main transmission, and only shows when the reception is exceptional. In this picture you will also clearly see the keying sidebands on Neil ZL1BNG's CW signal, which are normally at an acceptably low level. He is using a Hans Summers transmitter kit, a conventional crystal-controlled unit designed by G0UPL and G0XAR[8].

All three of these signals also happily get into the VK2DDI grabber day and night[9].

Androids

Android is the latest thing in operating systems for portable devices, and is available on a whole range of

continued on page 18

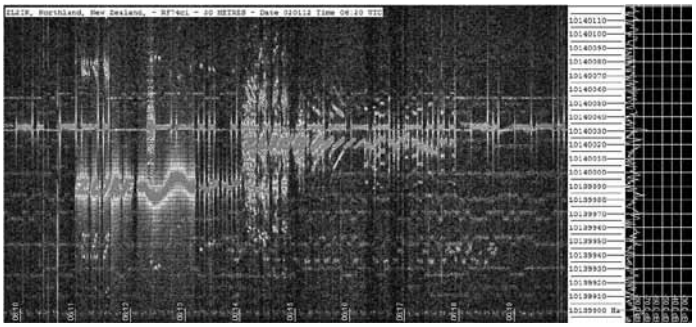


Figure 4. Intermodulation Effects.

continued from page 17

products from tablets to telephones. It is an open development platform used by many manufacturers. The system has a whole host of built-in features for mobile devices which are not seen on most computers; for example touch screens, multiple sensors including accelerometers and compasses (so you can rotate the screen or the view), WIFI, Bluetooth, GPS, voice recognition, hand writing and fingerprint recognition, cameras with smile recognition, cellular phone, email, text messaging and HSDPA (high speed data) are all included.

I've just bought myself a new 3G 'smart phone', and I've been absolutely staggered by what I now have in my $300 box the size of a playing card. You definitely could not buy all these features individually for the price! A conventional cell phone, portable GPS receiver, e-reader or camera could each cost this much alone.

WIFI

Many Android® applications (download them directly to your phone) are free, and few cost more than $10, which is a refreshing change from computer software. These applications work on a wide range of different appliances. With WIFI on your phone, you can surf the web, download applications, send mail, share photos, make VOIP calls etc, completely free (ie without using the cellular service), provided you are within range of an internet-connected wireless home network or hotspot. I also downloaded a really cool WIFI analyser, which finds wireless networks and analyses them! I found several networks in my street, and one of them was unprotected. Here is a snapshot (sent from my phone):

```
com.farproc.wifi.analyzer (3.0.2)
SSID=nilandi BSSID=00:1e:e5:8f:d4:5c
[WPA-PSK-TKIP] frequency=2462 level=-90
SSID=Belkin.3A8C
BSSID=94:44:52:70:da:8c
[WPS] frequency=2412 level=-92
SSID=DENWOOD WDS1
BSSID=d8:5d:4c:fd:b8:78
[WEP] frequency=2462 level=-93
SSID=NETGEAR BSSID=00:26:f2:59:1a:6a
frequency=2462 level=-78
SSID=TNCAP1813A9
BSSID=58:98:35:18:13:a9
[WPS] frequency=2437 level=-79
```

'DENWOOD WDS1' is my network. The list shows the network name and address, protection type, RF frequency (MHz), and the signal level (dBm). As you can see, the network "NETGEAR" is not encrypted or password protected, is quite strong, and I could log onto it from out on the footpath!

Final finals

The ROS mode has reappeared yet again[10]; this time in an application for LF and MF. There are very few users. I've not had an opportunity to try it, so if any of you do, let me know how you get on. The documentation is scattered and haphazard at best, and I don't yet know what the modulation technique really is. The best source of information is the group mailing list[11]. The ongoing controversy about ROS has been neatly summarised in an article by GW7AAV[12]. ROS is apparently still not permitted below 220MHz in the USA.

My advice to anyone wishing to develop a new digital mode is to do your homework very carefully. The new mode must of course offer some advantage over existing techniques, and it must also be well documented, technically sound and easy to use, matching the targeted propagation conditions, radio and computer hardware well. If you want wide acceptance of the mode, also make sure the details of modulation technique, coding and so on are in the public domain and acceptable to the FCC. Without this you might as well not bother, as the US market even now strongly influences what the rest of the world uses. When MFSK16 was released (described in an award winning QST article in 2000), the article[13], [14] included a sidebar agreed to by the ARRL, which describes the FCC acceptance which they sought on my behalf. MFSK16 is now included in all the major multi-mode digital programs, as well as many minor ones, and 12 years later is still arguably the best chat mode for long path DX.

References

[1] US Patent 2783384
[2] <cds.linear.com/docs/Application Note/an65f.pdf>, Appendix K
[3] <sdr-kits.net/QRP2000_Description.html>
[4] <home.arcor.de/baier/exchange/USB_Synth4a.zip>
[5] ARRL Handbook 1999, p17.98
[6] <www.qsl.net/kj5tf/n7ksb.html>
[7] <www.igrin.co.nz/~peter/Grabber.htm>
[8] <www.hanssummers.com/qrsskit.html>
[9] <www.users.on.net/~davroz/vk6di/argocaptures/argocaptures.html>
[10] <rosmodem.wordpress.com/>
[11] <groups.yahoo.com/group/O_P_E_R_A_/messages>
[12] <cqhq.wordpress.com/2010/03/05/ros-a-ham-radio-soap-opera/>
[13] MFSK for the New Millenium, Murray Greenman, QST January 2001,
[14] <www.qsl.net/zl1bpu/DOCS/MilleniumMFSK.pdf>

QSL Bureau

by Barry Stewart ZL2RR
<zl2rr@xtra.co.nz>

A Happy New Year to all readers! For the first time ever, I couldn't escape from being out of town for Christmas this year and on returning home for a couple of days before travelling north to canoe the Whanganui River, came across an e-mail reminder from the *Break-In* Editor so below is my best effort in the short time I had available!

My thanks go to those members who extended greetings for the Festive Season to the QSL Bureau volunteers; we were most appreciative of your kind thoughts.

On behalf of the NZART, I sincerely thank those members who, from time to time throughout 2011, forwarded a donation towards the Bureau costs with their QSL cards; they were greatly appreciated by your Association. The NZPO's action of killing off the 'Economy Mail' option from 1 October resulted in a substantial increase in the QSL Bureau's expenses.

The QSL Bureau's annual posting to the less 'popular' Overseas Bureaux resulted in fifty seven envelopes posted at year's-end; several of the less 'popular' bureaux missed out on a posting through the fact that no cards arrived for them. During the 2011 year the V7 Marshall Islands, TU Cote d' Ivoire and Albanian (ZA) Bureaux closed their doors! Checking through the ITU listing of QSL Bureaux, I found a total of twenty-three Bureaux have closed their operations over the past few years. Most of the closed bureaux received few, if any cards from ZL on a yearly basis.

A couple of interesting postings have been received by the Bureau during December. One was a returned envelope from Kuwait. Posted by me on 29 December 2010, it was returned with much of the big red arrow stamped on the front not readable and date-stamped 10 January 2011 on the back of the envelope by the Safat Post Office, Kuwait. This eventually arrived back in Box 857 on 6 December 2011. Checking with the ITU, the address is current for 9K so I have returned those cards with the December 2011 posting and hoping for a satisfactory outcome this time around.

The second posting was from Argentina which arrived at Christmas time when I was absent from town. Ninety eight per cent of the cards were for the 1998 – 2000 period and the other half dozen were for 2001, '03 and '04. I dug the wrapper out of the rubbish and found it date-stamped 6 December 2011!

NZART QSL Bureau preliminary figures for the year ending 31 December, 2011, indicate that QSL cards received from ZL operators were up around 600 whilst incoming DX Cards were up around two and a half thousand compared with 2010 figures. The incoming DX cards numbered eleven thousand more than those received for forwarding overseas. A number of QSL Cards in excess of eleven thousand from Japan during 2011 helped bolster the DX card count!

Inward QSL cards

The NZART QSL Bureau provides a free inward service for all New Zealand amateurs and listeners. This is a low-cost no fuss operation. Put simply; supply the appropriate ZL-Prefix Sub-bureau Manager with a number of self-addressed stamped envelopes (SASEs) if you want your incoming QSL cards. NO

Awards

Awards Manager: Alan Chapman ZL3GX
<awards@nzart.org.nz>

After a break of a number of years the Wairarapa Branch is back this year hosting the Golden Shears World Shearing Competition Award. A copy of the certificate is shown on this page.

Congratulations to WARO which is celebrating its 50th year and hosting an anniversary award.

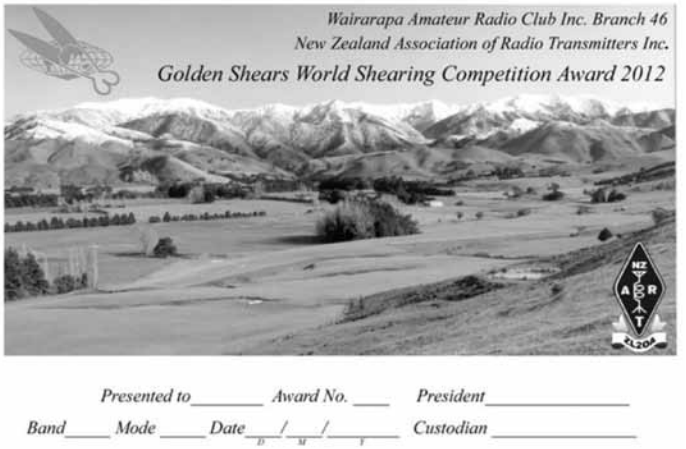
Golden Shears World Shearing Competition Award 2012

This Award is offered by Branch 46 NZART to celebrate the Golden Shears Society's World Shearing Championship Competition, an event of international significance. This competition draws competitors from New Zealand and worldwide. The award will run from Monday 20 February 2012 and conclude at midnight on Saturday 3 March 2012, the night on which the competition finals are held.

The award is available to all amateurs and short wave listeners,

Contacts will be confined to 80m SSB, local repeaters and National system. Any contact made on repeaters, National system or with Branch 46 members operating mobile are permitted.

New Zealand Stations require 10 points from those listed below:


Wairarapa Amateur Radio Club Inc. Branch 46
New Zealand Association of Radio Transmitters Inc.
Golden Shears World Shearing Competition Award 2012
Presented to_____ Award No. ____ President_____
Band_____ Mode _____ Date___/___/_____ Custodian _____

a) Compulsory contact with ZL6WSC 5 points
b) Contact with Club Station ZL2OA 3 points
c) Contacts with Branch members 1 point

Overseas stations require 5 points from those listed above but no compulsory contact with ZL6WSC is needed.

A copy of log details with appropriate fee is to be received at the following address before 31 March 2012.

The Award Custodian, Branch 46 NZART, PO Box 860, Masterton, New Zealand.

Award applications from New Zealand and Australian stations will cost $A/NZ 5.00. Award applications from other overseas stations will cost US$ 5.00. Award fees cover all NZ postage charges.

The Award Certificate will be a colour print portraying a scene of significance to the Wairarapa overprinted with the Golden Shears Emblem.

ZL6WSC, ZL2OA and Branch members will operate on a roster basis during the Award period on or about the following frequencies:

- The Awards Net – 3.677 Hz SSB most nights.
- The repeaters within Wairarapa and the National system will be monitored most evenings.

This information sheet is available by e-mail on application to <zl2fc@xtra.co.nz>.

WARO 50th Anniversary Award

3-12 March 2012

WARO members will be celebrating the 50th anniversary of the founding of WARO on 10 March 2012 and this award is being run in conjunction with this special event.

Ten points are required for this award and may be accumulated as follows:

a) ZL6YL 5 points
b) WARO executive members 2 points
c) WARO members 1 point

WARO members will be available each night on 3.695 MHz at 8 pm and the Awards net 3.677 MHz. Members will also come up on their local repeaters, ie Bombay 146.900 at 7 pm each evening and the National System.

Please forward your award application with log details and $5.00 to WARO Awards Manager, Lynnette McDonald ZL1LL, 25 John Street, Pukekohe 2120, New Zealand before 30 April 2012.

WARO HF Award

With a number of WARO members hopefully being on air, this could be a good time to complete the WARO HF award. Ten contacts are required with different WARO members. If this award is applied for at the same time as the 50th anniversary award there will be no extra charge.

Lynnette McDonald ZL1LL
Awards Manager

Club Awards

Clubs running short-term awards or new awards should send details of the award to me via email or at my *Call Book* address or the address below. Remember that *Break-In* is only published on even months and copy, including, if possible, a copy of the certificate, for inclusion, should reach me by the end of the even month.

The Awards Net runs on 80m, 3.677 MHz every night from 0800 UTC every night of the year. Every one is welcome to join in especially if you are mobile and in a rare county or district.

NZART Awards Manager, PO Box 1733, Christchurch 8140, <awards@nzart.org.nz> ,<www.nzart.org.nz/activities/awards/>.

SASEs, no cards — it is as simple as that! Unclaimed cards are held for a period before being disposed of. Please contact the appropriate Prefix Sub-bureau Manager if further information on the service they supply is required.

In addition, all NZART QSL Bureau information is available on Page 3-9 of the 2010 – 2011 NZART *Call-Book* and is also obtainable from the Association's website at <www.nzart.org.nz>. To access this, on the home page scroll down to the 'Quick Navigation' section (yellow background) and under the 'Activities' heading (bottom row, first column) Click on 'QSL Cards' and all will be revealed! This web page is updated if any changes occur during the life of the *Call-Book*.

Are you acting as a QSL manager for your own foreign call? Are you running a special event station with a special call-sign? Please have the courtesy to notify the QSL Bureau Manager so the volunteer staff know what is happening when they start getting inundated with QSL Cards for what would otherwise be an unknown call-sign. We cannot be expected to be aware of all that is happening in this great world of ours – though we do our best! We do get a lot of cards for station calls that are misread call-signs (especially CW QSOs) and we would not like to return cards for a legitimate station through lack of information on your part.

A number of operators are holding single suffix calls with different call-district numbers to that of their regular call-signs. QSL Cards for these single-suffix calls are sorted, along with all other incoming cards, and forwarded to the appropriate Prefix Sub-bureau so, for example, if you are a ZL1 with a ZL/ZM4 single suffix call, you need to supply the ZL4 Sub-bureau with self addressed stamped envelopes to claim such cards.

If you have any questions, queries (QSL managers' addresses, etc) or comments please feel free to contact me either via mail (1 Caversham Road, Westmere, Wanganui 4501 or PO Box 857, Wanganui Mail Centre 4540), or Email: <zl2rr@xtra.co.nz>.

73, *Barry ZL2RR*

VHF Scene

Simon Watt-Wyness ZL1SWW
<zl1sww@nzart.org.nz>

Here's hoping that you all had a good Christmas/past year and that Santa has been kind and delivered all these new bits of ham gear you have all been waiting for! Christmas has been and gone with another year looming up as I write this column, I see many ZLs having loads of fun and activity in the New Year with lots of nice openings.

Well it looks like this VHF Scene column has turned out to be a bumper issue due to the extreme activity on the VHF bands of late. Significant activity on 2m with 6m especially offering some nice contacts to Hawaii and Mexico to name a few. More details to follow in the relevant sections.

6m Happenings

Bob ZL1RS has been active in Rarotonga (E51) with a call of E51EME, judging by the logger activity, he has been having some good contacts on the 6m band.

Bob and his wife have been house sitting Victor E51CG's QTH, Victor and Bob swapped the present 5 element 6m Yagi on a 16ft boom with a 7 element 24 footer that Bob built up before he left. The new Yagi is up at 17m on the top of his tower. They were there until late January. He took his IC706 and the home brew 8877 linear amplifier that he built in September.

He has been working some good DX such as 5W1, ZL, VK, LU5FF, OA4TT, XE1AO, BA4SI, TI5XP and no doubt many others after the time this column was written.

Other activity has been happening from stations around ZL with ZL beacons been spotted by VK, E51.

30 Nov had FK8CP and NH7RO in to several areas of ZL with good signal reports.

22/23 Dec saw VK2, 3, 4 and 5 working into predominantly ZL3.

24 Dec has ZL working into JA and DU7/PA0HIP by Kerry ZL2TPY with 57 signal report.

On Christmas Day, JA is hearing the ZL video and VK2 / 4 are in along with Bob E51EME again mainly into ZL3. ZL2OK also worked TI7/N5B.

26 / 27 Dec has many contacts from VK 2, 3, 5 into ZL3, ZL3NW and ZL3ADT also worked XE1AO as well as BA4SI.

Rod ZL3NW reports on activity from his perspective at RE66HO. "With little terrestrial 6m propagation from my QTH during October it was great to have a 6m EME contact with Willem PA3HP on 16 October and a follow up contact with Ian G5WQ on 17 October. Indeed some of the best signals I have seen from Ian at -16dB on JT65A.

While Bob ZL1RS with his enthusiasm and location had some early DX contacts, it was not until 2 November that I had a short opening with just one contact with JG1TSG. It was great to have a contact with Kazu JA1RJU and Michio JN1JFC on 4 November. On 7 November the band was again open to JA with good propagation in the ZL2 and ZL1 areas. Mark ZL2WHO had contacts with 52 JA stations, one being mobile. In ZL3 I had contacts with 11 JA stations and it was a real highlight to have a contact with Li BA4SI as propagation moved. Li's activity has been very welcome and has provided many Pacific area stations with a new country.

It was a pleasant surprise to have an EME contact with Paul MI0AYR on 11 November on our first attempt. Bob ZL3TY also completed an EME contact with Paul on 12 November. Paul's new 9 element 15m boom antenna is clearly working well.

On 14 November the band was open for two hours between ZL3 and JA. Signals were weaker in other areas of ZL. I had 33 contacts and also one with Yoon HL5BLI. He was a true 599. Also on 14 November but the next day for me at 2355 I had a great contact with Bob K6QXY with his signal a good 579 and he gave me a 559 such were conditions for a short time.

16 November was the first day I had the usual Sporadic E to VK over the summer period with a contact to Dave VK7DD and Norm VK3DUT also heard. Numerous openings between VK and also JA to ZL3 occurred after this date. On 21 November at 0642 UTC I managed to work Willem DU7/PA0HIP and received a 439 report. My first contact to Hawaii KH6RH for many years occurred on 26 November at 05:56 UTC. My first Caribbean area contacts for many years occurred on 28 November with contacts with TI5XP and YS1AG and on 29 November with XE1FAA and on 30 November TI7/N5BEK.

It was a real highlight on 3 December at 21:54 UTC when I contacted K1TOL at a distance in excess of 15 000 km, K9RX also heard me. Later I had contacts with XE1FAA and XE1FAS. Just into the next day at 00:02 UTC I had contacts with K7JA and N6RW followed by contacts with XE1AO and XE1KK. On 5 December the band opened up to K6QXY briefly for a short contact and some hours later with very strong SSB signals to Hawaii with contacts with KH6RH and KH7JJ who was running 75 watts into a halo antenna in a city apartment. On the next local day, but still 5th, at 22:05 UTC I had a contact with XE2HWB and later with Jack N6XQ who is also very active as OA4TT at his other QTH. On 6 December at 00:44 UTC I caught up with Andy YS1AG again and some hours later at 06:07 UTC, Art KH6SX.

21 December was the first of many contacts with Bob E51EME (ZL1RS) and his activity has been very welcome by many. 24 December provided some interesting contacts and propagation. First there was an opening to JA with many stations contacted and in the middle of this opening I and several others had contacts with Willem DU7/PA0HIP. Two things were interesting here, firstly the band was open to both JA and DU at the same time and secondly the strength of Willem's signal. We exchanged 579 on CW and shortly afterwards we contacted on SSB. Willem reported my signal peaked at 59. The opening continued with many more JA stations worked and finished with a contact with Li BA4SI where his signal was 559.

26 December at 01:44 UTC provided contacts with Antoine 3D2AG/P Rotuma Island both on CW and SSB. I had worked him almost exactly 11 years earlier. His equipment is all solar powered and he is using an IC706 to a 5 element Yagi. At 23:21 UTC on 26 DEcember I had a SSB contact with XE1AO and later at 00:04 UTC on 27 December with XE2HWB using CW, the 27th also provided me with my first VK6 contacts working VK6OX, VK6JJ and VK6KP. The VK6RSX beacon was received from 05:53 UTC to beyond 10:04 UTC and the VK6RPH beacon for a short time at 06:07 UTC. Later at 08:28 UTC I had my first VK8 contact for the season with Marc VK8MS.

The closing of the year provided some good contacts. On 29 and 30 December I had contacts with W8IF, W8NXI, K6QXY, K5UC, K5RX, N5DG, XE1EE, XE1FAS & A35A.

Local ZL3 6m active stations who took part in some of the above action were: Duncan ZL3JT, Ross ZL3ADT, Neil ZL3ADC, John ZL3AAU, Murray ZL3MH, Roger ZL3THQ, Mike ZL3MF and Graham ZL3GS

2m and above Activity

There's been plenty of activity both in and out of ZL with many contacts from Bob ZL3TY into VK7MO, VK3GHZ and VK4OX on FSK441 in November.

7 November had some inter island contacts from ZL2WHO to ZL3CU, ZL3ADT and ZL3THQ. On 16 November, ZL4PLM worked ZL2WHO.

On 31 December UTC Bob ZL3TY is having some fun into VK2 and VK3 with 55/57 SSB reports into VK2DVZ and VK3EK as well as 529 into VK5DK and 529 into VK2ZT.

On 1 January 2012 Bob also has SSB/CW contacts to VK2DVZ.

Bob ZL3TY outlines his activities from Greymouth:

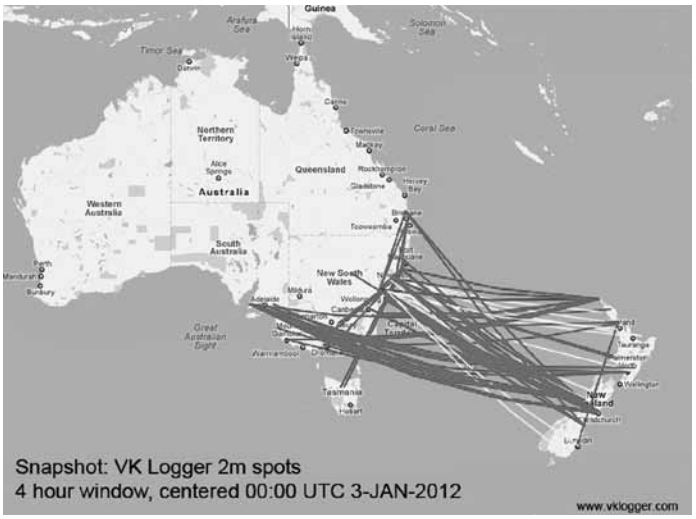
"After a day out on New Year's Eve (31 December), I arrived home and checked into the VKlogger to find the aftermath of the huge Es opening in VK. Checked 2m and found nil so left the receiver on 138.276MHz, the Channel 5A carrier from Newcastle. At about 5pm local time it started to lift out of the noise and a couple of hours later it was up to S3. The carrier was steady so it was apparently tropo, not Es. I started calling on 144.1 and at 0658z worked Steve VK2ZT 53/53. Later at 0940z (1040NZDT) I found VK3RED and VK3RGI beacons and started calling again on 144.1. By this time Ch5A was S9 and VK2ZT up to S7, then worked VK3EK, VK3DUT, VK3OE

and heard VK3VFO but he had high noise level and was unable to hear me. Then I heard VK5DK, Mt Gambier calling CQ, called him but he couldn't hear me. I called him on CW and he came back with a 529 report and we completed the QSO at 1050z. At 2629 km this is the longest distance I have worked on 2m tropo. New Year's Day 2m opened at 2348z (31/12/2011) and I worked VK2DVZ, VK2BCC, VK2MER and VK2EI, then later in the evening the VK3RED and VK3RGI beacons appeared about 0750z (1/1/2012) At 0755z VK3EK, then VK3UH, VK3UCQ, VK2ZT, VK3OE and VK3GHZ. Monday 2 January at 0428z VK2BCC, then VK2DO."

In addition to this, there were good 70cm contacts across the pond as well.

3 January had a huge E opening with many ZLs working into VK2, 3, 4 and 5. Colin VK5DK comments from his perspective. "This has been a fantastic opening on 144MHz with my first contact with ZL1TPH at 2350 UTC 2/1/12 and last contact at 0307 UTC 3/1/12. In all nine stations worked with some stations worked more than once as signals improved from original contact. Stations worked were; ZL1TPH, ZL1TBG, ZL2WHO, ZL3TY, ZL3AAU, ZL3NW, ZL3ADT, ZL4PLM and ZL3MH."

David ZL1DK also has interesting feedback regarding his activities. "Re ZL1 contacts, Bernie ZL4IS was actually beaming to VK at the time also but he is in a much better location than me for getting north. I have rising ground to the north of me plus many hills north of that. However the E signals come down fairly steeply. I was beaming north thinking I might pick up a ZL3 station over the hills, it was a huge surprise to hear Steve ZL1TPH. I also worked Ralph ZL1TBG in Warkworth with very strong 59 signals, and Harry ZL1BK in Auckland who was 53 from memory. Bernie went out and turned his beam north but the E layer doesn't wait around for long and he failed to make a contact. I have not heard of 2m Es contacts internally in ZL before. It's certainly a first for me. It is possible it has happened before but I would expect such a contact to be in the record books if it had been done."



A snapshot of activity in 4 hours from ZL to VK.

VHF Contest Notes

Several stations hit the hills for a bit of contest activity. For some, the weather was atrocious, so much to the extent that some stations had to pull out early.

The scribe reports … "Well the weather looked good in Auckland. As I was approaching Mt Tamahunga in the distance, I noted that the peak was in the cloud, not a good sign. On arriving at my site, I had 20 knot winds that still allowed me to get the antennas up. I also rigged up the microwave for 5.7 and 10GHz. Toward the evening the wind got up to 40-50 knots and at that point the dishes came down. 6/2/ 70 and 1296 still up and running. I had about two hours sleep with the car being buffeted around by the severe gusts. During this time, the cloud had settled in with about 100m visibility along with near horizontal rain. Whilst cosy in the wagon with no need to go outside, the weather stayed bad through the night and next day. At 9.30am, the weather deteriorated such that it was time to pack up. ZL1BQ, south west of Klondyke was also shutting down due to the similar weather conditions. Nonetheless, I had great contacts on 1296 with ZL1AKW at 210km and 2m also offered great contacts to ZL2ALW in Marton and Chris ZL2DX in Martinborough at 559km. ZL2AS was there but just couldn't pull him out of the noise. I also had a 70cm PA go click and that was the end of two finals so down to low power from then on. My IC706MKii packed in with no RF out on all bands after it was warm. PA is fixed but the '706 still evades me with the RF power being full output and then dying to about 2W out after about an hour of less. Harry ZL1BK also could not operate from Ruapehu as it was so windy there that he basically packed up and went home, a nice 350km trip for nothing."

Vaughan ZL1TGC reports on ZL1BQ activity. "The ZL1BQ Field Day site above Port Waikato was great on Saturday but overnight high winds (no rain) made for an interesting night as we waited to see if the tent was going to blow away. By 0800 on Sunday morning the rain arrived, and still the wind did not let up. Water was starting to blow into the tent (have to have some openings for the power and coax cables) and by 0930 Sunday we were starting to move power supplies, etc to keep them out of the water. Forecast was for the weather to deteriorate still further, we made the decision to bail out."

ZL2AS Warren also states. "Had a great trip up Oporae RE89co 755mASL. Worked ZL1BQ once, heard ZL1AKW and ZL1SWW but could not make a contact. Also worked ZL2IP, ZL3, ZL4PLM. Also heard ZL4AA once last night very briefly. 6m worked XE x 2 Made my day. The track up to our site was grass and 4WD territory only. Weather wasn't flash. Conditions weren't much better."

Terry ZL4TAE seemed to have rough conditions down south as he states. "Saturday was poor at Swampy Summit, snarky NE winds with norwester pushing a bit. Even the regular Canterbury contacts were up and down but early evening David ZL4DK and I were hearing weak voices and then clearly heard ZL2ALW and over the next ten minutes clearly heard ZL2AS and ZL2OK and I hear they heard similar bits from us, just on the tops of QSB. But no contacts. Simon ZL4PLM and others in Christchurch were getting similar sigs from them. Sunday started nice, cloudless, light southly wind and good sigs from the Canterbury gang. One contact with Chris ZL2DX and a couple with Bob ZL3TY. David worked an XE station 53 both ways on 6m and as the contest was wrapping up, the Newcastle beacon surfaced, VK voices were being heard at 1400 but we had to pack up. Had four bands working but not our best December FD. 432 and 1296 sigs pretty scruffy.

Steve ZL1TPH was up at Cape Reinga and we clearly heard 59 "… Papa Hotel Dah Dit Dah" at ZL4AA Swampy Summit. Heard about 6 MS signals, one I'm sure was ZL2OK. These were meteor bursts allowing partial snips of audio to be heard. The distance would have been 1275km. Looking forward to Feb field day."

Contest Results

Despite the bad weather, various hardy souls hit the hills with some good outcomes.

Total Scores

ZL4AA	RE54fe	2678
ZL2AS	RE89co	1385
ZL1SWW	RF73ir	1197
ZL2TC	RF80kl	274
ZL2KBR	RF80kh	80

Best DX

6 m	ZL2OK – W1IPL	14707km
2 m	ZL2DX–ZL4AA	645 km
70 cm	ZL3ADT–ZL4AA	323 km
23 cm	ZL3NW–ZL4AA	318 km

continued on page 22

Warren ZL2AS contest site, note the interesting rotator arrangement.

continued from page 21

93 stations active

Congratulations to the ZL4AA team; overall winners. Congratulations to band winners: ZL2AS, ZL4AA and ZL1SWW. Thanks to all the operators who participated as well as the members of the Wellington VHF Group Contest Committee.

Technical Corner

Contests are great fun but there is also need to keep things compact if possible. In the past the scribe has used a 2m Yagi constructed of old telescopic whip antennas with a hairpin feed. While it works well, I have issues with the elements getting out of kilter if knocked. (FYI, the telescopic whip project is at <http://www.qsl.net/zl1sww> and under constructional projects, look for "*A Portable and Collapsible 2m Contest Yagi*"). There has to be a better way to do this. Mark ZL1BNO found some Marley conduit clips that are in varying sizes and hence make great element mounts. I decided to make up a Yagi with VK5DJ's Yagi design program that follows closely the DL6WU designs. I like folded dipoles as driven elements and had some TV antenna feed point mounts so that sorted that part.

Using 25mm boom tube, I can comfortably clip the parasitic elements to the boom. I drilled small locating holes at about 3.5mm diameter in the top of the boom at the designated points from the software model. Using M3 bolts that slightly protrude below the inner part of the clip, will hold it in the fixed position without the elements getting crooked.

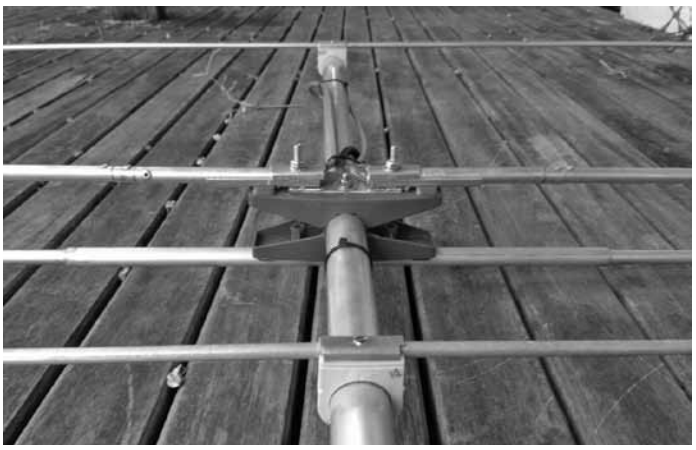
Using this system makes antenna building a doddle as these elements are above the boom, the boom correction factor is negligible. Building from the computer model created and antenna that was pretty much spot on for frequency and a good SWR was achieved.

On another note, I have always heard from numerous VK operators during 2m and above weak signal SSB contacts running a K tone generator that is useful in a couple of ways. One being that with short QSB peaks, it can alert you that someone is in the noise and two, is that quite often the last part of the over may get lost in QSB. Experience has shown that this K tone seems to cut through the noise more so than voice. Steve ZL1TPH uses one for long haul contacts that has shown to be beneficial. The ZL4AA team can vouch for that after hearing meteor pings with part voice and part K tone. Steve got his from VK1OD as a kit and it works well. I had a crack using a Picaxe-08M2 that was extremely easy to get going. I have built it in such a way that the unit can be plugged in the back port of an IC706 radio with the mic at the front. By default, it will be off, but if holding the PTT down for three or so seconds after power on, it will activate for as long as the radio is powered on. It will do K and T tones. A possible *Break-In* article may follow with more details.

2012 VHF-UHF-SHF Contest Calendar

DX Weekend Contest; All bands 50 MHz and up. 4-5 February.

Low Band Contest; All bands 50 MHz to 440 MHz. 7-8 April. Note that Daylight Saving ends half way through the contest; New Zealand Local Time applies on both days of the contest. <http://www.vhf.org.nz/pubs/Contests/VHF-UHF-SHF-ContestRules>



Using conduit clips for element mounts.

Old Timers' Club

Roy Symon ZL2KH
<zl2kh@xtra.co.nz>

Secretary/Treasurer:
Roy Symon, ZL2KH
Mail:
25 Annandale Street,
New Plymouth
Phone:
06-758-2156
E-mail:
<zl2kh@xtra.co.nz>
Monday Evening SSB Net:
Net details:
2030 hr (local time) each Monday on 3.870 MHz LSB.

We start 2012 with tidings of four members who have become silent keys; plus news of four members who have received certificates marking long service. Russell Crane ZL2AXN, has contributed an interesting piece of history which also tells us how he started in amateur radio.

Silent Keys

Sadly we farewell the following members:

- 1073, ZL2UU, Harry Tolley, Masterton
- 355, ZL2UJ, Peter Sadgrove, Cambridge
- 1273, ZL2UFN, Graeme Blyde, New Plymouth
- 929, ZL1BJP, Dave Parkinson, Tauranga

A minute's silence in their memory was observed on the Monday night net.

Certificates sent out

These folk have all received long service certificates:

60 Year Certificates:

- 849, ZL2ACE, Rod Greene, Wanganui
- 528, ZL4AG, Ralph Boshier, Auckland

50 Year Certificates:

- 857, ZL3AAB, Zelda Garlick, Motueka
- 1111, ZL1AUJ, Bob Warman, Te Koperu

Congratulations; and I hope you have many more years of activity.

53 years on

Recently the Wanganui City College celebrated 100 years. My job on the reunion committee was to set-up memorabilia displays covering Wanganui Tech Boys, City College years. A highlight of the display featured a Mk2 ZC1 wireless set. During my attendance (1951-1953) at Wanganui Tech., I joined the school radio club under the guidance of Master Ian Kerr ZL2AFR. (Later years, 1980's, the trustee was MJ Beale ZL2AXA). The ham station was set-up on a bench in the science lab and used the call-sign ZL2AJS. It was through the generosity of Ian giving up his time after school that encouraged me to be licensed in 1958. There must be many others; my older brother Gordon ZL2AFX, Eddie Lowe ZL2ABW, our Grand Old Man, OTC, Ivan ZL2ATU …

Perhaps NZART Branch Radio clubs, could be set-up to function as a "Special Activity Period" for schools. (Open to all Intermediates and Colleges). During the reunion, pupils attending the school showed much interest in the "radio club station" displayed from yesteryear.

73, *Russell Crane ZL2AXN*
OTC 1000, Wanganui

Conclusion

Thanks for this piece Russell. Russell also made the suggestion (which I heartily endorse) that other OTC members should be encouraged to send in details of how they became hooked on our hobby.

Roy Symon ZL2KH
OTC Scribe

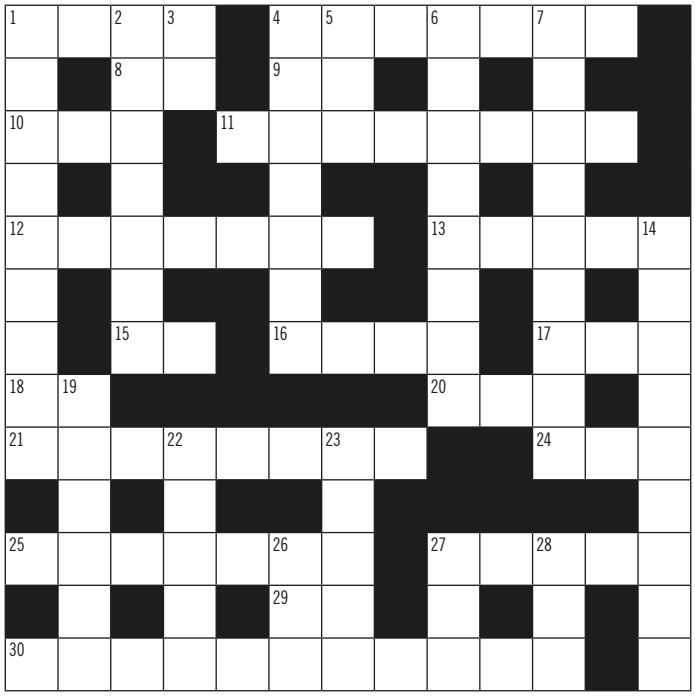
Summary

Many thanks go to the contributors who help make this column happen with their input – ZL1TPH, ZL3NW, ZL3TY, ZL2AS, ZL1DK, ZL4TAE, ZL1TGC and others. If you have input and pictures for the columns ahead; such as DX activity reports, repeater installation, branch activities, snippets of interest, technical items etc, please send to Simon ZL1SWW <zl1sww@nzart.org.nz> or *Call-Book* addresses. (I also accept large picture files sent via email).

Russell Crane ZL2AXN.

ZL Crossword 15

Compiled by Graeme Hunt ZL1ANH



Across

1. Channel carrying cables, and a route for some tropospheric propagation (4)
4. Fine tune a receiver to make clear (7)
8. Castrated cattle beast, and a prefix for a country falsely named by Eric the Red (2)
9. South American country south of Ecuador prefix (2)
10. By way of (3)
11. Atomic number 74, chemical symbol W (8)
12. Sometimes applied to rapidly changing frequencies, with an ability to be nimble (7)
13. Words referring to a place, person or thing (5)
15. Small European Grand Duchy prefix (2)
16. A good story and twisted strands of fibre (4)
17. Abbreviation for an organisation not run by a Government or local body abbrev (3)
18. Person on the key (2)
20. Muscle twitch (3)
21. Found within the nuclei of atoms (8)
24. Nevertheless, or in spite of that (3)
25. Magazine first published in 1928 (5-2)
27. A35 (prefix) (5)
29. Initials for a juice and an American footballer found not guilty of murder (2)
30. Type of current that comes out of your wall socket (11)

Down

1. Term used with FM relating to frequency shift (9)
2. Type of cable for your PL259 plug (7)
3. Not RX (2)
4. An entity in the DXCC award (7)
5. Abbreviation for the system grouping computers at one place (3)

6 and 7.
Every coil and antenna and even some bridges have this (8, 9)

7. see 6 above
14. Frequencies above 1800 kHz (9)
19. In the USA it's gas (6)
22. What's on the screen of your scope (5)
23. Warrior of feudal JA (5)
26. Electrically charged atom (3)
27. Prosthemadera novaeseelandiae, and maybe near the Anglican Priest (3)
28. Drink this, or use it when building a wall (3)

Answers on page 32.

SPREAD THE AMATEUR RADIO STORY

New Zealand Amateur Radio Day 2012

This will be held on 10 March from 1000 to 1400 hours

Branches are encouraged to set up a station in a prominent area in their local community, and to make contact with other NZARD stations and home stations. Make sure you seek the appropriate permissions to establish a station, with the council or businesses as appropriate.

Media inclusion is to be encouraged. Be sure to have pamphlets at hand. Contact NZART HQ for pamphlets.

A good idea is to have some hams operating equipment, and other hams available to talk to public and explain what amateur radio is and our place in the community, and how easy it is to get an amateur licence. After the event follow up with anyone who showed interest, and assist them with gaining their amateur licence.

The purpose of NZARD is twofold. To expose our hobby to the community and to prospect for potential amateur operators.

Please take photos and write a short activity report, and submit to *Break-In* for publication.

Any questions please send to Warren ZL2AJ at <warren@zl2aj.com> or 021-649284.

Satellite Orbits

Andrew Barron ZL3DW
<ad.barron@xtra.co.nz>

The amateur radio satellite ARISSat-1, deployed from the ISS on 3 August, fell silent on Wednesday, 4 January, as it re-entered the Earth's atmosphere. The ARISSat website shows the last telemetry was captured at 06:02:14 UTC on 4 January with high temperatures: (IHU PCB 75°C, PSU 76°C, RF 88°C, Batt 55°C, RF Enc 67°C). The predicted impact point was an open part of the South Atlantic, west of Angola.

AMSAT-UK will load its FUNcube-1 CubeSat pico-satellite onto a converted intercontinental ballistic missile (ICBM) that is set for take-off in the third quarter of 2012. Once in orbit, the spacecraft will use a 145MHz telemetry beacon to transmit signals for schools and colleges to analyse. They will be able to receive the data stream which contains telemetry; things like battery voltages and solar panel currents; from this they'll be able to deduce things like the spin rate of the satellite, and what happens to temperatures when it goes into or out of eclipse.

In addition to providing educational outreach for schools and colleges around the world, the spacecraft will provide a U/V linear transponder for radio amateurs during local 'night', at weekends and during holiday periods. FUNcube-1 will go up on a DNEPR rocket, one of a batch of old ICBMs that are being converted to take satellites into space. It will take off from the Yasny launch facility in southern Russia, in a launch organised through the Netherlands' ISIS Launch Services. According to AMSAT-UK, the precise orbit of the spacecraft is yet to be determined. However, the group said it will be "nearly circular" and mostly sun-synchronous, so the largely solar-powered device will be illuminated almost all the time.

The AMSAT-UK team hopes the FUNcube-1 will last for between two and eight years. The longevity of the device is down to how long its batteries provide charge, and how severe the radiation damage to various electronic components turns out to be.

The first student-built amateur radio CubeSats to be sponsored by the European Space Agency's Education Office have passed their final acceptance review and have been declared ready for launch on board the maiden flight of Vega, the new ESA launcher. Seven Cubesats built by students from universities in Poland, Spain, Italy, Switzerland, Romania, France, and Belgium have been selected for a free ride to low earth orbit. The launch window for this historic lift-off opens on 26 January and ends in the first week of February 2012.

The lucky seven includes; Xatcobeo (Spain) a mission to demonstrate Software Defined Radio and solar panel deployment, Robusta (France) a mission to test and evaluate radiation effects (low dose rate) on bipolar transistor electronic components, e-st@r (Italy) demonstration of an active 3-axis Attitude Determination and Control system including an inertial measurement unit, Goliat (Romania) imaging of the Earth surface using a digital camera and in-situ measurement of radiation dose and micrometeoroid flux, PW-Sat (Poland) a mission to test a deployable atmospheric drag augmentation device for de-orbiting CubeSats, MaSat-1 (Hungary) a mission to demonstrate various spacecraft avionics, including a power conditioning system, transceiver and on-board data handling, and UNICubeSAT (Italy) in-situ measurement of the neutral atmospheric density, which is made possible by the low perigee altitude of the VEGA Maiden flight orbit. All have downlinks on Amateur Radio frequencies and PW-Sat also has a Voice Repeater mode (aka "AO-16" mode); Uplink 435.020MHz FM (15 kHz), Downlink 145.900MHz DSB (3 kHz).

The primary payloads on the Vega inaugural flight are the spherical Laser Relativity Satellite LARES and ALMASat-1 (an Educational Satellite built by University of Bologna, Italy).

ALMASat-1 has a VHF uplink and relatively high power 2W UHF and 3W S-Band digital downlinks, using off the shelf modules from well known ham radio suppliers,

One of the last images captured from ARISSat-1.

Hamtronics and Kuhne. The satellite also has a micro-propulsion system which is to perform three different types of experiments:

- three axis stabilisation and target attitude maintenance;
- momentum wheel desaturation and pitch axis fine pointing;
- small orbital manoeuvre, aimed at raising the S/C altitude (semi major axis).

Check out the excellent website <http://www.almasat.unibo.it/02_projects/almasat-1/almasat1.htm>.

The LARES satellite is completely passive. It is made of tungsten alloy and houses 92 cube corner retro-reflectors that will be used to track the satellite via laser from stations on Earth. LARES body will have a diameter of about 36.4 cm and weights about 400 kg.

The Dutch team that produced Delfi-C3 (DO-64) is planning to launch a new amateur radio satellite, the Delfi-N3XT in September 2012. It will be launched on a DNEPR rocket and carry a 435/145 MHz linear transponder for SSB/CW communications and a 2400 MHz telemetry beacon. The experimental ISIS Transceiver (ITRX) it will carry is an in-orbit configurable radio with high efficiency. The ITRX aims to tackle the problem of very limited available power within nanosatellites. The power amplifier in the transmitter section is the most dominant in power consumption. Conventional linear amplifiers have typical efficiencies of about 30%, which means much of the power is wasted as heat. A switch-mode power amplifier currently being developed for the satellite can yield efficiency above 80%.

Finally, Triton-1 and Triton-2 are scheduled for the same launch as Delphi-NX3T. They are 3U Cubesats and each carries a radio science mission that aims to test an experimental advanced AIS (Automatic Identification System) receiver. Telemetry decoding software will be made available which will allow radio amateur operators to listen to periodic downlink broadcasts containing housekeeping telemetry, payload telemetry as well as received AIS messages. After the 3 month science mission has been completed the satellites will be available for general amateur radio use. Triton-1 carries two single channel mode U/V (435-145MHz) FM to DSB transponders. Triton-2 carries a single channel mode U/V (435-145MHz) FM to DSB transponder and a single channel mode U/S (435-2400MHz) FM to FM transponder.

So there are plenty of new CubeSats due for launch in 2012 which should offset the loss of AO-51 and FO-29 to some extent.

As always I am keen to hear about and publish details about your satellite activities, so drop me an email to <zl3dw@nzart.org.nz> and photos are especially useful. I am also very happy to answer any questions that have you puzzled or will help you get started.

73, *Andrew ZL3DW*

SUPPORT OUR ADVERTISERS THEY SUPPORT *BREAK-IN*

Monitoring Service

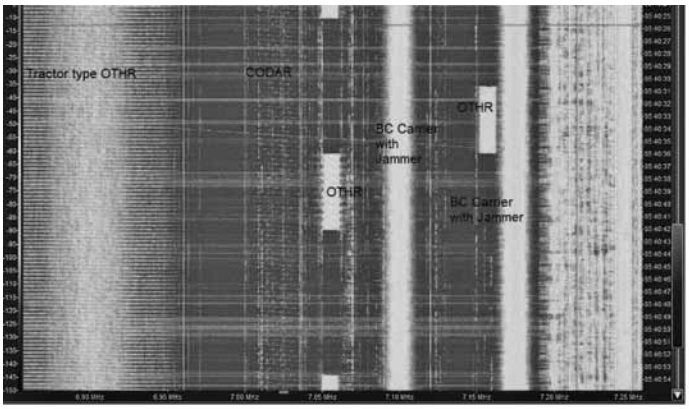
Monitoring Service Co-ordinator: John Martin ZL1GWE
<john.martin@nz1.ibm.com>

Happy New Year to all, including Short Wave Listeners and contributors. In this initial start for 2012, you will find out who won the inaugural NZART Top Intruder System Observer award for 2011, but that is later on.

The screenshot shown in Figure 1 indicates the state of 40 metres in late December 2011; the OTHR (Tractor type radar on the left hand side has moved out of the 40 metre band after a formal complaint was raised by the ACMA in Australia), previously it frequented the CW section of the band. However, the latest reports suggest this has not been successful, as there have been further intrusions into the CW segment on 40 m. The CODAR is frequently within the 40 m band, but is infrequently reported. The BC stations on 7100 and 7180 are shown with carriers and their associated jamming stations. If one happened to be up at 0500 hours local within New Zealand, the above indicates the mess that 40 metres is currently in. It also indicates the importance of Intruder Watch activities or Monitoring Service within IARU Region 3. All these signals interfere with the activities of amateur radio enthusiasts, who want to communicate with like minded people. However, without the motivation of reporters either frequently or infrequently reporting these intruders, then the intruders will remain unreported and unidentified. So I implore those who care about the state of the amateur bands to make it a New Year's resolution to report what you hear or see and if you have the opportunity, to provide audio samples. A second resolution, if you have not sampled the ability to see signals using a panoramic display or Software Derived Receiver (SDR), even for one band, you are missing a great deal. SDR's are now often used within competitions to record the entire session and then replayed as a waterfall display, the results can be quite revealing; or used as band spotters. So imagine what they provide to listeners, DXers, SWLers; the ability to not only hear, but also to see signals to a very low resolution.

During the last few months, I raised an idea to the various monitoring intruder watch contributors within Region 1 and Region 3, as most Radio Amateurs report DX (distance) spots via DX Clusters i.e. DX Summit[1], DXwatch[2], SK6AW[3] amongst other clusters.

The idea (appears to have been well received) is to find as many different means of obtaining intruder reports from as many Radio Amateurs or SWL's as possible, as the more reports obtained from different parts of the globe along with important details, provides over time a vast knowledge. This knowledge can be put to good use for gathering information about particular characteristics of intruders including their operating patterns. If this information included your source location code or Maidenhead locator or grid square, it would be possible to cross reference reports and provide additional information that regional Monitoring Service reporters could use for tracking and tracing persistent intruders. Most DX Clusters, will only accept call signs, however others are a bit more lenient, accepting code words such as: OTHR (Over The Horizon Radar); CODAR (Oceanographic Radar); Pirate or P1rat Suspected Pirate stations; BC or Broadcast (Broadcast stations or Intruder), Non amateur radio intruders into radio amateur primary or secondary spectra.



The state of 40 metres as of December 2011.

The SK6AW cluster is a particularly interesting one as it offers, via its options tab, the ability to use it for both normal DX spotting but also for searching for intruders using the code words shown above. If one also puts in ones location as well, it provides information, which can be triangulated with other similar reports. Although it is in beta mode initially, it looks promising, in terms of not only potentially providing your Azimuth (direction) but also the distance in kilometres from your location. This information is very useful, in terms of analysing reports and identifying the source of the original transmissions. So, please contribute to the community and help us to keep the amateur bands free for everyone else's enjoyment.

On the subject of direction finding: go to <www.piccodopp.com>[4] and look up the GoogleHunt direction finding software program, which is free. Download the program, and follow the instructions carefully, as this program can provide manual plots without GPS input and archive up to 100 plots. When it is used with Google Earth (which is also free), and integrate GoogleHunt with Google Earth, this provides a very useful tool, with a 50 mile radius limitation. This can be extended by using the Ruler under the Google Earth Tools menu, to extend the original plot overlaid on Google Earth plots? Because Google Earth allows you to input the original heading ie, 315 degrees, and stay accurate, you can easily extend the plot around the world. Combining this with at least 2 or 3 plots provides a useful indicator of the source of the original intruder, hence the reason we request the general direction, when providing reports, if possible. This information can be used to verify reports, and provide greater collaboration between IARU Monitoring Service Coordinators to then raise complaints with their respective Telecommunication Authorities or TA.

The inaugural winner of the first NZART Top Intruder System Observer Award for 2011 is ZL1TZE; well done Philip, who wins a free full membership to NZART for 2012. Who will win this award in 2012?

The solar figures are at an all time high; we need your contributions, either directly or indirectly, keep those reports coming. I will be repeating this message regularly in 2012. So I hope you will endeavour to add to your New Year Resolutions lists: Report more intruders in 2012 and participate!

Report intruders to: <MS@NZART.org.nz> or <MS2@NZART.org.nz> or <IntruderWatch@GoogleGroups.com> or to your favourite DX Cluster.

John (ZL1GWE)

Intruder System Observer League Table 2011 (up to end of December 2011)

Contributor Name/Call-sign	No. of reports received	No. of verified reports
John ZL1GWE	473	473
Bob ZL1BAD	276	276
Gary ZL2iFB	47	47
ZL2TZE	22	22
Dallas NZRDXL	11	11
ZL2CC	2	2
ZL1TPH	6	6
ZL1CC	1	1
ZL1AAO	1	1
ZL1OGX	4	4
ZL2SKY	1	1
ZL3NB	1	1
Luke VK3HJ	1	1
Others	0	0

References

[1] <http://www.dxsummit.fi/>
[2] <http://www.dxwatch.com/>
[3] <http://www.sk6aw.net/cluster/>
[4] <http://www.piccodopp.com>

DX Downunder

Graeme Hunt ZL1ANH and ZL1T
<graemeh@xtra.co.nz>

Power Limit Raised

New Zealand Amateurs are now authorised to use 1000w PEP. From the RSM website: "Except as provided to the contrary in this notice, transmitter power output must not exceed 1000 watts peak envelope power (pX), as defined in ITU Radio Regulation 1.157."

Special thanks to NZART, particularly Roy ZL2KH and Don ZL2TLL, who presented our application to the Government so ably.

There is a varied range of allowable power across the world; for example, Canada tops out at 2.25kW, USA 1.5kW, UK and Australia are 400W and Oman 150W.

The HF bands, particularly 12 and 10m, have been hopping. They are open 24 hours a day and just with a casual appearance during the CQWW CW contest in November I was able to work 35 of the 40 zones throughout the world. Four of the zones I missed didn't appear to be active during the contest, so the band really was open world-wide. Places like ZD8, C5, A52 and D2 all went in the log – a far cry from the situation a year ago.

Maybe your New Year's resolution is to mount a DXpedition. ZL isn't too far from lots of exotic countries, easily accessible and much sought after by DXers throughout the world. In the last Break In we read of Bruce's E51 DXpedition; here is Steven's adventure.

ZK2AB Niue September 2011

Niue is 2400 km northeast of New Zealand. It is a 269 km2 raised coral atoll and one of the world's largest coral islands. The coastline is rugged and the reef that surrounds the entire island only has one major break in it, close to Alofi, the capital of the island. There are somewhere between 1000–1400 inhabitants on the island, however, 90–95% of Niuean people now live in New Zealand.

The short three hour flight from Auckland, along with the tropical heat and no active Amateurs currently residing on the island, were the key attractions for choosing it as our radio/holiday destination.

Initially the idea was to have a week long holiday with just a small radio set-up to talk to friends and family back in ZL. However, quite early in the planning stages it developed into something more elaborate. Especially once a posting went up on <www.QRZ.com> with details about the trip and I began receiving numerous emails requesting skeds from Amateurs around the world. The look-up count alone indicated to me that ZK was a much needed contact for a lot of operators and that perhaps I should take the preparation a little more seriously.

Planning a trip can be half the fun. It kept me occupied for several weeks. First I had to obtain a radio license for Niue. The best way is to phone Niue Post and Telecommunications as emails are not guaranteed to get through the island's high level spam filter. The radio license cost $NZ56 and all I had to do was pick it up and pay the fee on arrival.

Operating position radios.

There are a few different accommodation options ranging from one resort, a couple of motels and some local houses, called fales, that you can rent. We chose the latter. It proved to be ideal as it was isolated and situated on a cliff-top.

A rental car is essential on Niue as there is no public transport. I arranged the car hire before we left. You can then pick up your car from the airport and, provided you call into the rental office sometime during your stay to pay, you can then leave the car unlocked with the keys in it at the airport on departure.

There are no ATM's on Niue and only a small number of places will take credit cards. At the time of our trip Air New Zealand only flew to Niue once a week. The plane departs from Auckland on Saturday morning and three hours later you find yourself in tropical Niue on Friday in the early afternoon. The day of arrival is the busiest there. It feels like the entire population has turned out to welcome the recent arrivals.

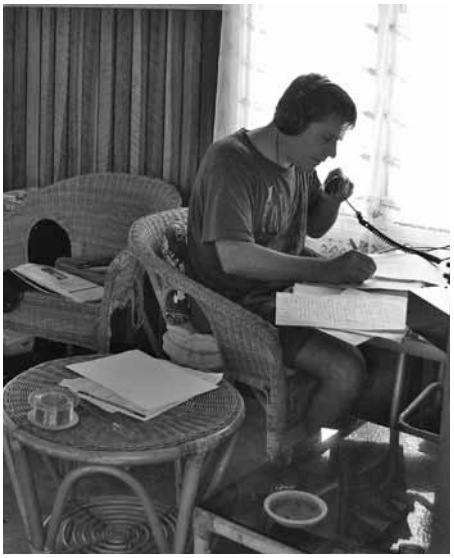
Once through immigration and out of the airport we were guided to our accommodation by Jim, one of the owners. Then it was back to the capital Alofi where we discovered you can't get your local Niuean drivers license until the following Monday due to all the police officers still being out at the airport in their official capacity there.

The local supermarket's hours are limited with small stocks of mainly tinned and packet foods that are expensive. We had been forewarned that fresh food like salads and vegetables were hard to come by, so we brought most of our own food with us from New Zealand. Providing you declare it on arrival you can bring in just about any type of food to Niue.

Once we had everything we needed we headed back to our fale so that I could set up at least one antenna before it got dark. I managed to

Trees antenna.

Fale antennas.



Steven operating.

set up the FT–840 radio and the 20m dipole at 40 ft on the cliff-top overlooking the ocean. It was hot work but worth the effort to get on the air that first night where I made around ninety contacts.

The next morning I got up early to beat the heat, flies and mosquitoes and set up the 40 m dipole and the Buddipole on top of a 32 ft fiberglass pole for 17–10 m. I also took approximately 300 ft of coax and managed to use it all.

I had noticed before I left New Zealand that the radio conditions were very up and down. But with perfect timing they became ideal on our arrival in Niue, with all the bands showing activity. By the end of the week I had made a total of 1250 contacts and spoken to 68 different countries. But the biggest surprise was that I made 650 of those on 10 m.

ZL2OK gets the prize for contacting me on four different bands; 20, 40, 12 and 10. Other highlights include making a contact with V51B, ZS1A and EA50N/M amongst many others.

Niue is a fantastic destination for radio amateurs or just as a place to get away from it all. It is a beautiful island where humans are substantially outnumbered by the island's population of ants, geckoes, mosquitoes, flies, chickens and roosters. You won't find any crowds or shopping malls – there are very few shops at all but it has great swimming, snorkelling and walking and a small number of cafes and restaurants.

Should you decide to visit Niue and operate some radio there, be prepared for big pile-ups and a letterbox full of QSL cards.

I would like to say a big thank you to my XYL Joanna, who made all the meals and put up with me bellowing on the radio through the day and night.

We hope to go back to Niue again one day but next time we will go for two weeks instead of one.

Steven McQueen
ZL4CZ / ZK2AB

Many of the nearby Pacific Islands are ideal for DXpeditions. Some are easily accessible, have regular commercial flights, tourist accommodation and your XYL may even want to tag along. The number shown is where the entity appears on the most wanted DXCC list; where 1 is the most wanted (incidentally Navassa Island).

E51: Southern Cooks (133) has several resident operators and is popular with visiting hams.

ZK2: Niue (76) recent operations will have increased this number.

YJ: Vanuatu (94)

3D2: Fiji (115) possible political problems?

A35: Tonga (80)

ZL7: Chatham Islands (83) take your thermals.

FO: French Polynesia (152) plenty of residents and visiting operators.

VK9L: Lord Howe Is (75)

VK9N: Norfolk Is (107)

5W: Samoa (95)

In the harder basket, and where your XYL won't be so keen to holiday.

ZK3: Tokelaus (58) fresh water shortage.

E52: Northern Cooks (64)

ZL8: Kermadec, surprisingly only at (97), permits and transport difficult.

ZL9: Auckland and Campbell Islands (11) permits and extreme transport difficulties.

C2: Nauru (51)

There are quite a few more this side of the equator, if you are thinking of a DXpedition let me know for early publication. Note: for "difficult" above read "expensive"!

Malyvysotskij Island R1M, which everyone knows, is rented by Russia from Finland–and now they are giving it back, as even the Russians found it too difficult to pronounce. It is a separate entity but hasn't been activated for many years. Look for this one to be deleted as a DXCC entity shortly.

DXpeditions

Plenty to look forward to:

Afghanistan T6MO for next 12 months.

Angola D2QV Valery is active on CW, SSB and RTTY: 40m/20m/17m/15m/12m/10m till July 2012

Antarctica ZS7KX Gerard on 14.175 MHz around 1400 utc until Feb 2012. May be on 18Mhz also

Burundi 9U look for HA3JB, now living there. 20m SSB and PSK31

Djibouti J28RO until July 2012

Franz Josef Land R1I two hams are wintering over until September 2012

Malpelo HK0NA Jan/Feb 2012, big operation and keenly awaited.

Marshall Islands V73NS for the next three years

Singapore 9V1RM for the next three years

South Shetlands VP8/SS EA1CYK/p until March 2012

Swaziland 3DA Phil, G3SWH and John, EA5ARC (G3OLU) from 21-29 February.

Temotu Province H40FK and HK0FN February 2012, including 160m and 6m

ARRL report there are now over 700 000 licensed amateurs in the USA; currently they all seem to be on 10m.

ZL Special Calls

– none advised for this issue

Nets

ANZA Daily: DX net at 0515z on 14183 kHz and now also Saturdays 0445z on 21205 kHz. On Mondays, Fridays and Saturdays it is followed by the Pacific DX net on the same frequency from 0600z.

Arabian Net: Fridays only 0500z 14250kHz–host JY5HX and features exotic Middle East calls.

ZL Dxers: Tuesdays 8pm 3777 kHz

What's on the air now?

<www.dxsummit.fi/DxSpots.aspx>

Announced operations

<www.ng3k.com/Misc/adxo.html>

QSL information

<www.qrz.com>

Sunspots

<www.solarcycle24.com/>

Acknowledgements

ARRL DX, 425 DX, OPDX DXNL(Darc), ARLD044 DX News, Club Log(Most wanted).

Contact me at *Call-Book* address or by email at <graemeh@xtra.co.nz>.

FMTAG – Frequency Management and Technical Advisory Group

Secretary: Doug Ingham ZL2TAR
<fmtag@nzart.org.nz>

Final recommendations to Council

Branch 60 Taupo has applied for a VHF Linking Station (VLS) at Maroanui, located at TOPO50 BF36 634.01 323.75, to provide a link between the Maroanui 675 repeater and the Taraponui 725 repeater. The link transmit frequency will be 147.850 MHz and the receive frequency will be 147.250 MHz.

Comments and Applications

Please send your comments and suggestions on the above matters, and on any other FMTAG matters, by e-mail to: <fmtag@nzart.org.nz>.

Applications for repeaters, beacons, digipeaters, point-to-point links, and so on, should be made on the latest version of FMTAG Form 10. The latest versions of FMTAG Form 10, and the explanatory Form 10A, are available on the NZART website: <http://www.nzart.org.nz/fmtag/index.html>.

Completed forms should be sent by e-mail to <fmtag@nzart.org.nz>. The current status of Applications can be viewed on the NZART website: <http://www.nzart.org.nz/nzart/fmtag/fmtag-apps-being-processed/>.

NZART Examination Training DVD

The series of 15 DVDs have been completed and are available via NZART HQ. This series is very much an individual's (mine!) interpretation of how to present the material. I have kept the scripting fairly informal in order to maintain the material similar to how I would teach a class in person. I have checked the material and hopefully there are no obvious errors. The level of material is at, or a little above, the question bank for the exam. In order to teach material of any kind you do need to go a little above the level of the examination at times for clarity of explanation. The introduction on DVD1 covers this.

The technical quality is quite acceptable although some of the earlier material is a little low in video resolution but still adequate; this was due to the learning curve in the process of going from digital tape to DVD.

Any suggestions/constructive criticisms are welcome, please email me. I would like to acknowledge the invaluable assistance given by Grant Simpson ZL2BK in the technical production and Jim Meachen ZL2BHF in cleaning up a few rogue soundtracks.

Stuart Watchman ZL2TW <zl2tw@nzart.org.nz>

AREC – Amateaur Radio Emergency Communications

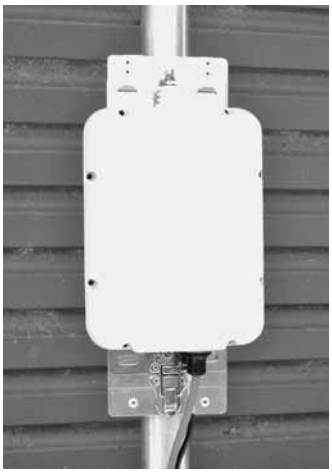
Geoff Gillman ZL3QR and Bev Gillman ZL3OV

AREC Mission Statement:
To be the preferred provider of Emergency Communications to New Zealand Emergency Services.

Hi, everyone. We trust that you have all returned from the holidays totally refreshed and recharged ready for the year ahead. For those of us down here near "Shakesville" all we hope for is the ground to stop shaking for a while, preferably a long, long while.

A mounting plate for Icom AH4 Automatic Antenna Tuner and mounting to antenna pole

Our AREC Section have started to use an end-fed antenna for SAR and other HF field communications when required. The antenna radiator is cut to 32m long and is supported by two 50mm, three section aluminium poles. One of these poles has the mounting being described riveted to it above the joint. The pole consists of two 1650mm sections and a top section with halyard of 550mm long (total of 3.85 m high). Guying is by a triangle shaped plate that just fits over the inner telescoping portion of the second section, before the shorter top section is slid on. The three points of this plate have an adjustable guy line attached.



Icom AH4 Front.

AH4 Mounted side view.

The AH4 mounting plate is constructed from two lengths of aluminium unequal angle 40 x 20mm and a plate of aluminium 380 x 120mm. There are two hooks, made from 15mm wide aluminium strap, 40mm long attached to the top of the plate and aligned with the two slots in the upper attachment bracket fitted to the AH4 housing. The lower end is retained to the plate with a suitcase latch. The anchor portion of the latch is riveted to the lower attachment bracket and the catch portion is riveted to the plate.

All assembly is done by best fit so that the AH4 attaches snugly when completed. The original attachment method of the AH4 is by two 'U' bolts and nuts. From experience these are unsuitable because the nuts are easily dropped in the grass, the one man assembly is quite difficult and worst of all with cold and wet hands its almost impossible.

Next task is to make extension cables for the AH4 to the Icom F7000 radio. I have made a 25m coax extension and used two PL259 barrel joiners for the RF cable. The control cable was extended by the same distance using some five core trailer lighting cable (using four of the conductors). Cut the existing cables in half. Fit the PL 259's to the coax. To provide a joiner for the control cable I used four pin XLR Amphenol Mic cable connectors (Jaycar PP1040 male and PP1042 female) plus the rubber cover boots (Jaycar PM1034). Put a male and a female on the cut ends of the control cable so they can still be used as a short cable and the same on the extension, so it can be used to extend the control cable.

Antenna AH4 Mounting.

Brian ZL2ADL//ZK8EW/ ZK6EXT

Activity Briefs

(A selection from Nov/Dec)

1/11/11. North Canterbury Branch 68. Rural Fire. Eyrewell Forest. Fire in large pine hedge close to a plantation. Forest Fire unit called to assist NZFS but were delayed in getting underway and were stood down while en route. Later, a recall due to a flare-up, but due to sufficient other units available, Forestry units were not required. AREC provided comms/logistics for Forestry unit.

6/11/11. Tauranga ECG Branch 88. SAR Training. Hanga Road, Upper Kaimai near summit SH29. Tauranga Sarex with guest from Hamilton and Rotorua SAR members. Locate party of four, one school teacher and three students reported overdue, party failed to return to pick up point. A mix of SAR teams from Tauranga Search and Rescue with members from Hamilton and Rotorua, briefed at 07:00 hr and transported by the Tauranga 4 x 4 Rescue Club to start of each teams starting point.

9/11/11. Northland Branch 28. Whangarei Police Station Land-SAR meeting with SAR field officer Ian Newman SAR operational planning and discussion with committee and interested Members.

13/11/11. Eastern BOP Branch 51. SAR Training. Lions Hut, Upper Waimana Valley. Three day Sarex with module training of map, compass, GPS and radio. Four teams sent out using above methods and with VHF only , the second four teams using only HF, tracking the first four two hours later. Next day roles reversed. Good basic training with notable improvement in skills.

13/11/11. Marton Branch 23. SAR. North eastern corner of ATG Waiouru, on Rangitikei River/ Otamateanui Stream confluence. Missing hunter (one of a party of three), missing on Saturday evening. Taihape SAR Heli'ed in one team and did aerial search as the light allowed on Sunday afternoon, nothing found. Search ramped up on Monday. Teams and IMT arrived at Taihape Police Station at 0700. Moved to Waiouru Police Station where search HQ set up. Missing party located 1430 in Rangitikei River by Helo and extracted fit and well. WX fine but cold, later rain, hail and sleet.

13/11/11. Papakura Branch 65. Sports & Training. Maramarua Forest Car Club Hill Climb. Good Comms.

14/11/11. Papakura Branch 65. CD Training. Papakura Radio Clubrooms. GobalSET international emergency communications exercise. One message sent to VK4WIA, working as a relay.

17/11/11. North Canterbury Branch 68. Rural Fire. Ashley Forest. Permitted fire to clear windrowed cut-over logging slash became out of control in gusty wind conditions. NZFS, Rural Fire and Forestry units required to extinguish fire. AREC supplied Comms/Logistics for Forestry units.

19/11/11. North Canterbury Branch 68. Rural Fire. Ashley Forest. Flare-up of a fire of two days previous. Forestry units plus heavy machinery required to quell and bury the fire. AREC supplied comms/logistics for forestry units.

19/11/11. East Southland Branch 08. Sports & Training Mokoreta, Catlins District. Mountainbike and run/walk event. 153 mountainbikers, runners and walkers completed 10, 21 and 40km distances. Eight commercial radio telephones were programmed to a local repeater, mag-mount aerials and DC power cords were provided for safety and tracking.

19/11/11. Otago Branch 30. Sports & Training. Lawrence, West Otago. Assist the Otago Sports Car Club with communications from the start, centre and finish positions of the 2011 Lawrence

Rally. Communications were provided via the Clutha District Council Civil Defence Network "CDC" and the officials used Terry ZL4TAE's commercial repeater EE228.

28/11/11. Otago Branch 30. SAR. Hermit Ridge, Silverpeaks, north of Dunedin city. Search for one male and one female who became lost while tramping down Hermit Ridge. They camped out for the night and managed to phone the police for help in the morning. A search team was flown via helicopter and dropped off in the search area. After several hours the missing party was located and extracted by helicopter as the weather was closing in. Search teams were stood down at 12:06. Radio communications was provided via EE108 fixed repeater.

29/11/11. Wairarapa Branch 46. SAR. Search for 13 year old in school group. The boy went missing while walking with a school group from Walls Whare to Totara Flats. He had been seen at Clem Creek but was not noticed missing until the party reached the Flats, at about 8.30pm. The party had a mountain radio and were able to speak to Wellington Mountain Radio Service who notified the Police. The school party had two guides with them. They, and two parents, started a search from their end. Two teams from SAR were sent to Walls Whare, with tasks to check the track via Cone Saddle to Totara Flats, and the direct track. About ten minutes after the teams left Walls Whare a radio message from Totara Flats said that the missing party had returned there, safe and well, with one of the school party's teams. Most of those involved were home by about 2am.

30/11/11. Hamilton Branch 12. Sports & Training. Waikato River between Cambridge and Taupiri. Safety communications for the Bridge-to-Bridge water ski racing event on the Waikato River on 3 and 4 December 2011. Totally successful. The Section STSP on 146.675 was used for the main communication path. There were no significant injuries and only one boat crashed with no injuries to the crew. Two operators, one each from Tauranga and Taupo assisted the Hamilton Section.

1/12/11. Southland Branch 37 SAR Waikiwi Gardens Rest Home, Invercargill. Elderly woman missing from rest home since 1600 hr, 1 December 2011. Arrived at the local Police Station at 1800 hr for end of year Landsar BBQ, where I was then briefed to team up with Ian Watson, Landsar Field Support Officer, to drive around points of interest in search for the missing lady, who we found all OK one hour later in the backyard of rest home.

4/12/11. Otago Branch 30. SAR Training. Dunedin City. Join the New Zealand Land SAR Dunedin Group entry in the Dunedin Santa Parade.

4/12/11. Papakura Branch 65. Sports & Training. Auckland CBD. Safety comms for women's fun run. 2700 women competed, no issues.

6/12/11. Marlborough Branch 22. SAR. Richmond Ranges. Search for missing tramper. Stood down as body found by police.

6/12/11. Southland Branch 37. SAR Training. Branch 37 Club Rooms. Invercargill Wanda Track Training. Sergeant Ian Martin from the Invercargill Police gave a brief talk and demo on Wanda Track. Invercargill AREC will start checking Wanda Track pendants regularly to be sure the eight pendants in Southland are still transmitting. We are now on the SAR callout list to assist with any Wanda Track searches.

6/12/11. Eastern BOP Branch 51. SAR. Waioweka. 15 year old high school student separated from two others. Helicopter dropped two teams in but on return found boy with teacher and lifted both out to camp. All teams at Opotiki Police Station stood down.

8/12/11. Eastern BOP Branch 51. SAR. Taneatua. Search for missing woman in depressed state. Woman found by search teams on second sweep face down in gully. Taken to hospital.

11/12/11. Christchurch Branch 05. Sports & Training. Waimakariri Gorge. Classic Kayak Race Safety Communications. AREC provides river safety communications over the Mt White to Gorge Bridge section of the Waimakariri River. This operation includes HF and VHF communications from up to five jet boats and four shore stations. AREC provide communications to confirm each section of the river is clear, and any kayaks that require assistance are managed with support crews sent to the most appropriate point to collect the paddler and/or boat. This year the HF communications net used 5.320 MHz as the primary HF frequency, a mix of VHF simplex and a STSP repeater. 118 kayaks successfully negotiated the course from Mt White Bridge to the Gorge Bridge. This race, although separately organised, also provides a practice run for the Coast-to-Coast event the following February over the same course.

Conclusion

Thanks to those who have contributed to this issue. Material for the next one to please be in our hands by 3 March 2012. Photos, if included, preferably on a separate CD (with captions) mailed directly to us. E-mail pix may be acceptable but will be at the Editor's discretion and must not be embedded in the text. Contact details: <zl3qr@nzart.org.nz> or <zl3ov@nzart.org.nz>, or post to 6 Boyd Street, Rangiora 7400, or phone (03) 313 7137.

(NB. Articles to be in doc, rtf or txt format. Publisher or pdf we can not use. Thanks.)

Reminder

The next Section Leaders Nets should be 20 February and 19 March, 3900 kHz USB at 2030 hr NZDT unless notified otherwise.

Until next issue,

73, *Geoff ZL3QR & Bev ZL3OV*

New Members

Name	*City Town*	*Branch*	*Call-sign*
I G Honey	Cambridge	4	ZL1IAN
PJ MacArthur	Dunedin	30	ZL4TLA
D S Bryant	Rotorua	33	ZL1DSB
B Fields	Waikouaiti	30	ZL3XDJ
David Phillips	Upper Hutt	63	ZL2DBP
Q Pooke	Christchurch	56	ZL3YOK
C Buckley	Whangarei	28	ZL1CLE
N McFadyen	Tauranga	33	ZL1TOI
W Stringer	Christchurch	5	ZL3WLS
K Callahan	Wairoa	11	ZL2KCW

MEMO to *Break-In* contributors

CDs:

Nowadays many contributors are sending me graphics and photos, etc on CD and this is much appreciated. At present the cost of a CD is less than the postage costs so, unless requested otherwise, they will not be returned. Please let me know asap if I still have a CD or photo that you would like returned and I will action.

Thanks, *John ZL3IB Editor*

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WARO – nz womens amateur radio operators

with Topsy ZL2LS, Sharon ZL2BQ and Ngaire ZL2UJT
<waro@nzart.org.nz>

Happy New Year to all WARO members and readers. By now most of you will be back from your holidays and we hope that you all had an enjoyable time, relaxed and ready for the challenges of 2012. We would love to receive any articles on any members travels or things of interest that you would like to share with us all, if you would like to send them to us please do so by using the WARO email address <waro@nzart.org.nz> to be sure they get to us on time by the end of February 2012 please.

WARO profiles

If you have not done these, shame on you, as we did ask for them all to be in by the end of December so that they can be put into book form for the up and coming WARO Birthday. If you haven't done this by now you have missed out, as by the time this goes to print the profile book will be at the printers. Jolene is planning that this will be ready for the birthday on 10 March 2012.

WARO 50th birthday activities

We are all aware that WARO turns 50 on 10 March 2012, and of the Luncheon which is to be held at the Millenium Rotorua on Saturday 10 March at 12 midday, a reminder to get the notification form back to Margaret by the end of January. If you are planning to attend this function, and if you want accommodation please send it direct to the Millenium Hotel, not to Margaret, or make your own arrangements. If you leave it too late you will miss out. For the South Island girls who cannot make the luncheon up north, if you would like to be involved in a celebration, the Nelson girls are planning a lunch out, yet to be decided. If we get enough interest or enough people wanting to come to Nelson for the weekend we will make a weekend outing of it with lunch and dinner that evening and some local sightseeing if the numbers are adequate. Please get in touch with Topsy ZL2LS if you are interested in joining in with the Nelson girls. Topsy will need to know this by the end of January, so think about it and get in touch with her.

WARO Bulletin / *Break-In* articles

Don't forget to keep sending the information in for the bulletin and for the *Break-In,* we cannot do either of these without your input, so please think of us who have to put this altogether. No information, no articles, means no publication either. It is your bulletin and your page in *Break-In* so start contributing to it or we could lose it. Time to tell us about all the things you have been involved in lately either in your club or on your own. We would all like you to share these with us. Next deadline for articles for the Bulletin is 17 March and we are sure that there will be heaps from the anniversary dinners that we are all having. Deadline for *Break-In* articles is 10 March so send them on in girls please. Thank you in anticipation.

Thelma Souper Memorial Contest 2012

The WARO Executive has decided that WARO will not be holding the Thelma Souper Memorial contest in 2012. This decision was not made lightly. Unfortunately due to the lack of support over the last two Thelma Souper memorial contests by our WARO members and also the OM's (there was only one OM who put his log in this year). It was unanimously decided to have a break for one year and if our members can give assurance that they are prepared to give up four hours of their time to take part in this contest the Executive will consider running it again in 2013.

WARO 50th Anniversary AWARD; 3-12 March 2012

WARO members will be celebrating the 50th anniversary of the founding of WARO on 10 March 2012 and this award is being run in conjunction with this special event.

Ten points are required for this award and may be accumulated as follows:

ZL6YL	5 points
WARO Executive members	2 points
WARO Members	1 point

WARO members will be available on 3.695 MHz at 8pm and the awards net 3.677 MHz. Members will also come up in their local repeaters and national system. Please forward your applications with log details and $5.00 to WARO Awards manager, Lynnette McDonald ZL1LL, 25 John Street, Pukekohe 2120 New Zealand before 30 April 2012.

WARO HF award

As hopefully a number of WARO members will be on the air this would be a good time to complete the WARO HF award. Ten contacts with different WARO members are required. If this award is applied for at the same time as the WARO 50th Anniversary Award there will be no extra charge.

Lynnette McDonald ZL1LL
Awards Manager

WARO members please support this award, people have taken the time to create these awards for us, so let's please get in behind them and support them. Cheers *Topsy*

Please remember to support your Bulletin, your WARO page in *Break-In* and most of all your fellow WARO members who take the time to get competitions up and running for us, and to have no one support them is soul destroying. So please remember you only get as much back as what you put into something, so come on one and all let's make 2012 something special in WARO, other than our 50th birthday.

Cheers, take care, travel safe and most of all look after each other. That's all from us this month

Topsy Zl2LS, Ngaire ZL2UJT,
Sharon ZL2BQ

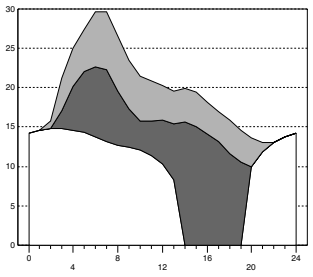
How 33's began

Clara had her ticket
She also had a rig
Because she was just starting
It wasn't very big.
She slowly tuned the crystal,
And watched the meter drop.
Then tapped the key a couple times
To be sure it wouldn't stop.
Now everything was ready.
She called a short CQ
And received an answer
On thirty-six sixty-two.
They chewed the fat 'bout stuff and things.
'bout dresses, work and dates.
They finally called it QRT
The girl sent eighty-eights.
Clara thought it might funny
Whether it be Miss. or Mrs.
To end a perfect QSO
By sending "Love and Kisses"
It sounds too sentimental;
Just a little too much "goo"
To be sending "Love and Kisses"
To a girl the same as you.
For an entire week she pondered;
Wouldn't even touch the rig.
She pushed her slide rule by the hour,
Employing "logs" and "trig".
She added and subtracted.
What could the answer be?
To reach a happy medium
Twixt eighty-eight and seventy-three.
Clara finally looked up from her work
All smiles and not forlorn.
Twas July in Nineteen Forty
That thirty-three was born.
There's no real definition
But it's meaning is known well.
It's how a YL says good evening
To another friend YL.

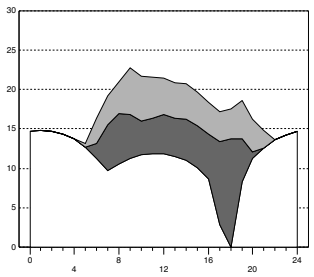
From Margaret Dunn KC7LXS (original Author unknown)

Ionospheric Predictions

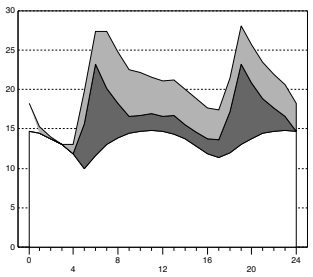
MARCH / APRIL 2012 **T-index = 78**



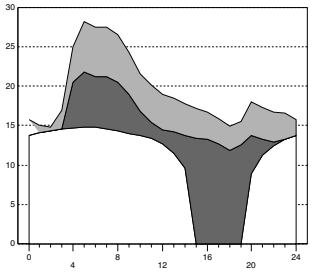
WN-
Moscow
(SP)
16548 km
312°



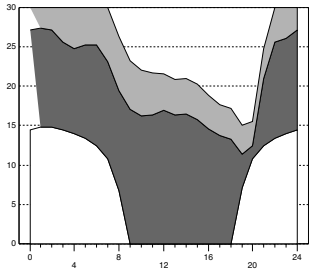
WN-
London
(SP)
18814 km
343°



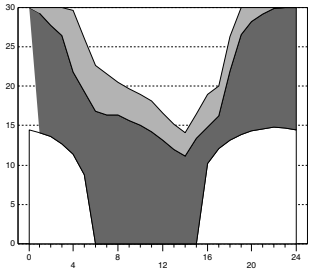
WN-
Jo'burg
(LP)
28265 km
31°



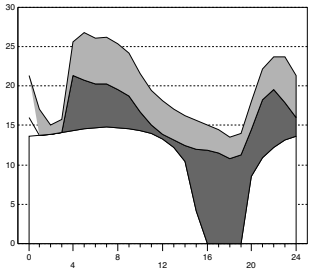
WN-
Istanbul
(SP)
17168 km
281°



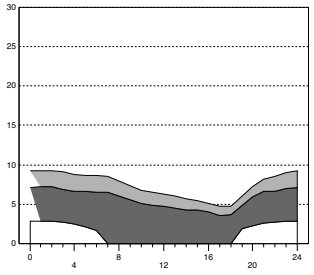
WN-
Tokyo
9274 km
332°



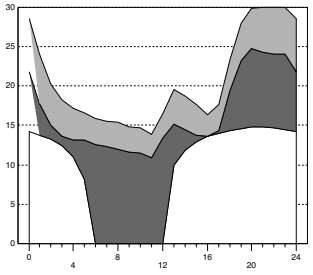
WN-
San
Francisco
10859 km
45°



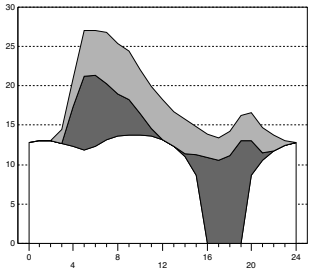
WN-
Cairo
16519 km
261°



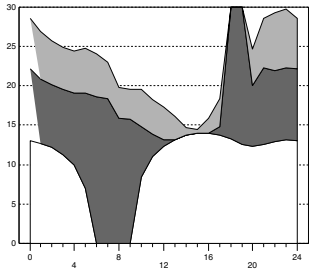
WN-
New
Zealand
300 km



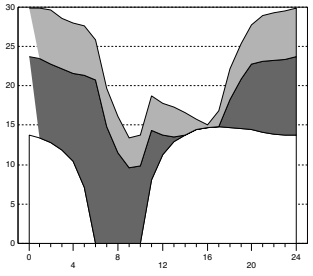
WN-
New
York
14402 km
66°



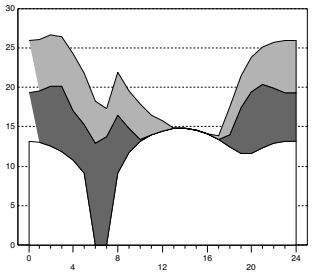
WN-
Jo'burg
(SP)
11759 km
211°



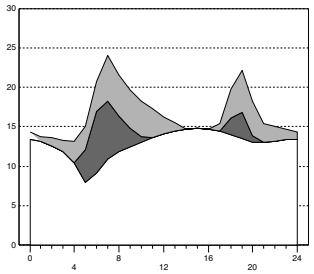
WN-
Rio de
Janeiro
11780 km
144°



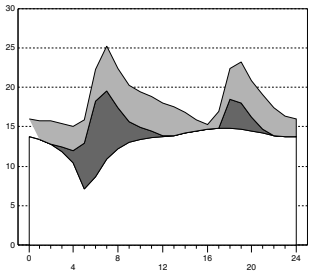
WN-
Barbados
13962 km
104°



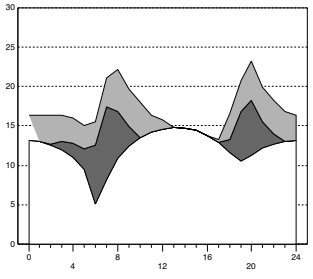
WN-
Dakar
16862 km
155°



WN-
Moscow
(LP)
23476 km
132°



WN-
Istanbul
(LP)
22856 km
101°



WN-
London
(LP)
21210 km
163°

Horizontal axis shows time in UTC.

Vertical axis shows frequency.

Propagation is possible in the shaded areas, with best operation in the darker area.

These predictions are based on solar activity data supplied by IPS Radio and Space Services.

See pages 6–9, Break-In May/June 2004 "Choosing the Best Frequency" by the late John Gabites ZL2AQ for interpretation of forecasts and explanation of terms MUF, OWF and ALF.

HAMADS

WANTED: RADIO VALVES. Cash paid for old radio and TV valves. Prefer new in boxes. Ph (09) 575-6940 or E-mail <paul.ssegrub01@gmail.com>.

WANTED: FT101E – working or suitable for parts. Also, any Yaesu station equipment. ZL3TFM. E-mail <bksmith@snap.net.nz>.

WANTED: Valves wanted to purchase, fair price paid, all types but esp following types: ECC32, ECC33, ECC34, ECC35, B65, 6SN7, 6SL7, ECC81, ECC82, ECC83, ECC803S, ECC88, E88CC, E188CC, 7308, EF86, KT61, KT66, KT88, EL34, EL37, PX4, PX25, GZ32, GZ33, GZ34, GZ37, CV378, CV575, VT52, 45, 50, 211, 801, 805, 845. Also looking for an AVO or Weston Valve Tester and a good quality capacitor tester. Geoff Edwards, Valve Radio Spares, 12 Oxford St, Lyttelton 8082. Ph (03) 328-9208 or (027) 433-8452 or Fax (03) 328-9207 or E-mail <tubehead@xtra.co.nz>.

WANTED: Two 811 valves or equivalents. Contact ZL2AFQ, email <iduxbury@xtra.co.nz> or CB address.

FOR SALE: Eddystone 640S receiver with extras, $250 ono. ZC1 Mk2, battery operated with two sets of valves, and extras, plus remote; all in going order. Offers? Ph 04-5670371.

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For more information please visit www.radiodx.com where you can download a sample DX Times or request an info-pack from:
NZRDXL, PO Box 39-956, Howick, Manukau

Answers to crossword on p23

Across: (1) duct, (4) clarify, (8) OX, (9) OA, (10) via, (11) tungsten, (12) agility, (13) nouns, (15) LX, (16) yarn, (17) NGO, (18) op, (20) tic, (21) neutrons, (24) yet, (25) Break-In, (27) Tonga, (29) OJ, (30) alternating.
Down: (1) deviation, (2) coaxial, (3) Tx, (4) country, (5) LAN, (6) resonant, (7) frequency, (14) shortwave, (19) petrol, (22) trace, (23) ninja, (26) ion, (27) tui, (28) nog.

Hamads and Classified Advertising in *Break-In*

Hamads up to 30 words are now free as a service to members but the following conditions will apply:

(1) Hamads. A single, free Hamad in each issue of *Break-In* is only available to financial members and Branches of NZART buying or selling personal equipment. Members and Branches wishing to use this service must include their NZART Membership Number or other evidence of membership. If possible they should use the official HAMAD form (on the reverse of their address sheet). If this is not convenient the advert may be emailed or sent typed double-spaced, but proof of current membership must be provided.

Each free Hamad is limited to 30 words; any extra words will be charged at the current rate of 25c per word, telephone and fax numbers count as two words each, e-mail addresses and *Call Book* address as three words each. All prices include GST. Free Hamads will also be accepted for sales of deceased estates where the member was a financial member of NZART during the past 12 months and from branches who are financial members of NZART (ie have a Membership No).

Advertisements are accepted in good faith from amateurs and may only be used be the sale of used radio and allied equipment. The Association, or its representatives, can take no responsibility for them nor take part in any discussion resulting from sales or purchases; remember "Caveat emptor". In case of dispute, the Editor's decision is final.

Trade or business adverts, even from members, will not be accepted here, since this is a subsidised service to members.

(2) Classified Advertisements are available to members, non-members and commercial firms offering products or services for sale, etc. All adverts not meeting the Hamad criteria will be considered to be Classified Advertisements.

Classified Advertisements will be charged at 40c per word. Bold type is available at 50c per word. For semi-display (ie rule above and below) add $5.00. All Classified Advertisements must be pre-paid, receipts will not be given. All prices include GST.

(3) Display style adverts will be still be charged for at the current rates.

(4) Closing date. Please send Hamads and Classified Advertisements to The Advertising Manager, PO Box 1733, Christchurch, to be received no later than the 10th of the month prior to publication. Please make cheques payable to NZART; no cash or credit cards. The Editor and NZART Inc reserve the right to discontinue or decline any advertisement.

For further information and commercial advertising rates, please contact:
Lorne Douglas ZL2AHB, Advertising Manager, c/- PO Box 1733, Christchurch. Telephone (03) 358-9100. E-mail: <hamads@nzart.org.nz>.

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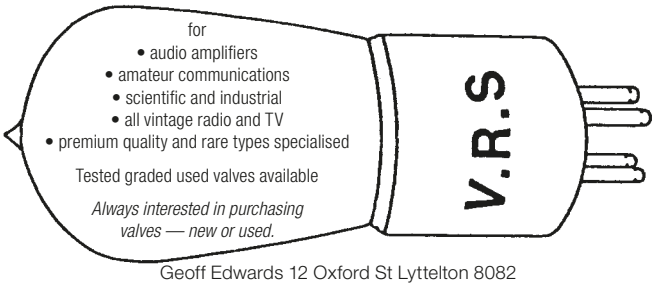
Importers and stockists of quality valves of all types and related items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REMEMBER: Leave a three second pause between overs when using repeaters. Someone else may have an urgent message.

Te Puke Amateur Radio Club Inc.

Annual "Junk Sale" – Saturday 3 March 2012

Paengaroa Community Hall, Old Coach Road, Paengaroa.

Open 06.30am, Sale at 10.00am.
$20 per table or $12 for half a table

WARO get together at 10.30am • Hot breakfast from 07.30am

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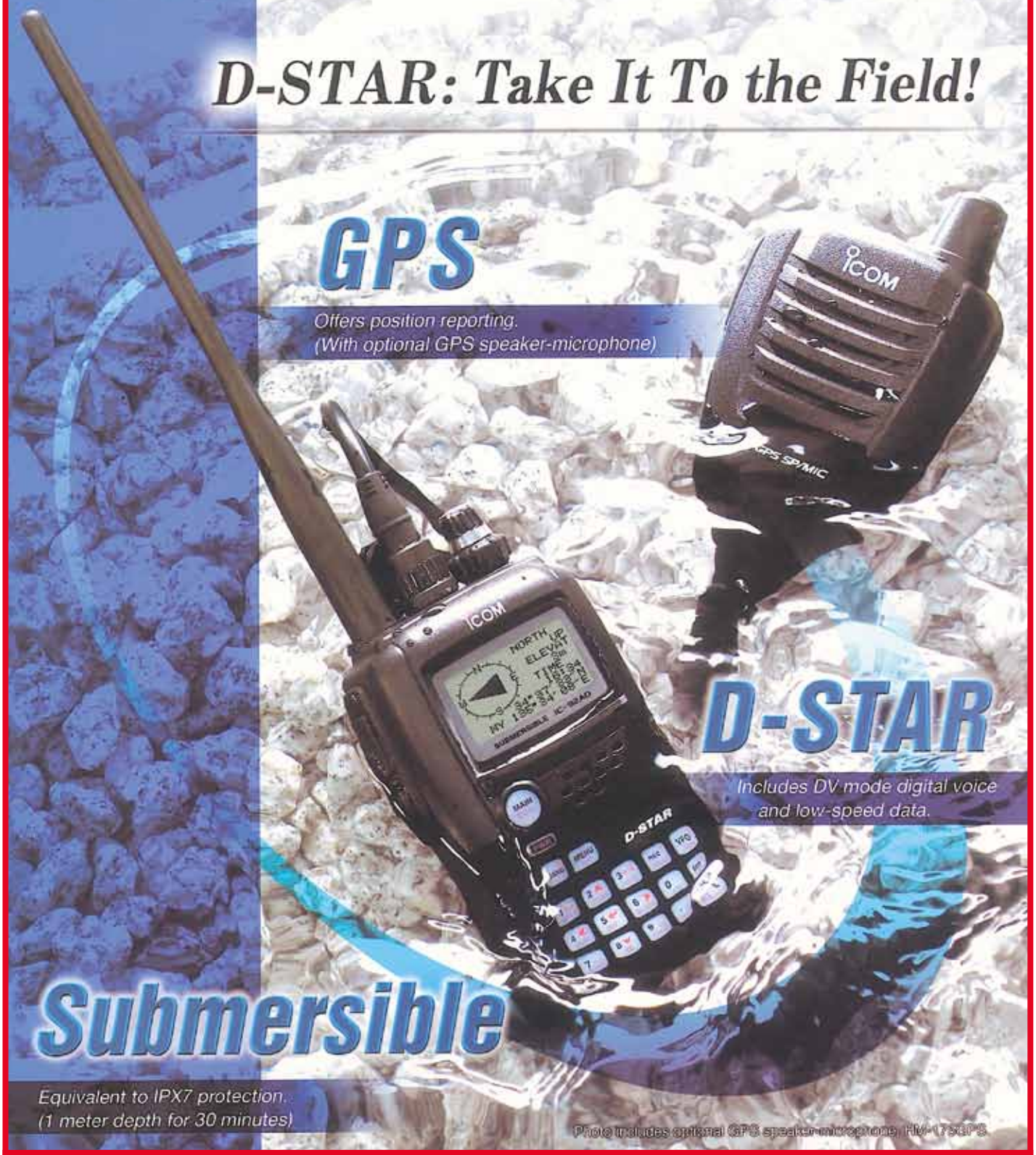

Photo includes optional GPS speaker-microphone HM-175GPS.

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